United States Department of Agriculture
Forest Service

Emigrant Crevice Mineral Withdrawal

Draft Environmental Assessment

Custer Gallatin National Forest
Park County, Montana

March 2018

Emigrant

Crevice

For More Information Visit:
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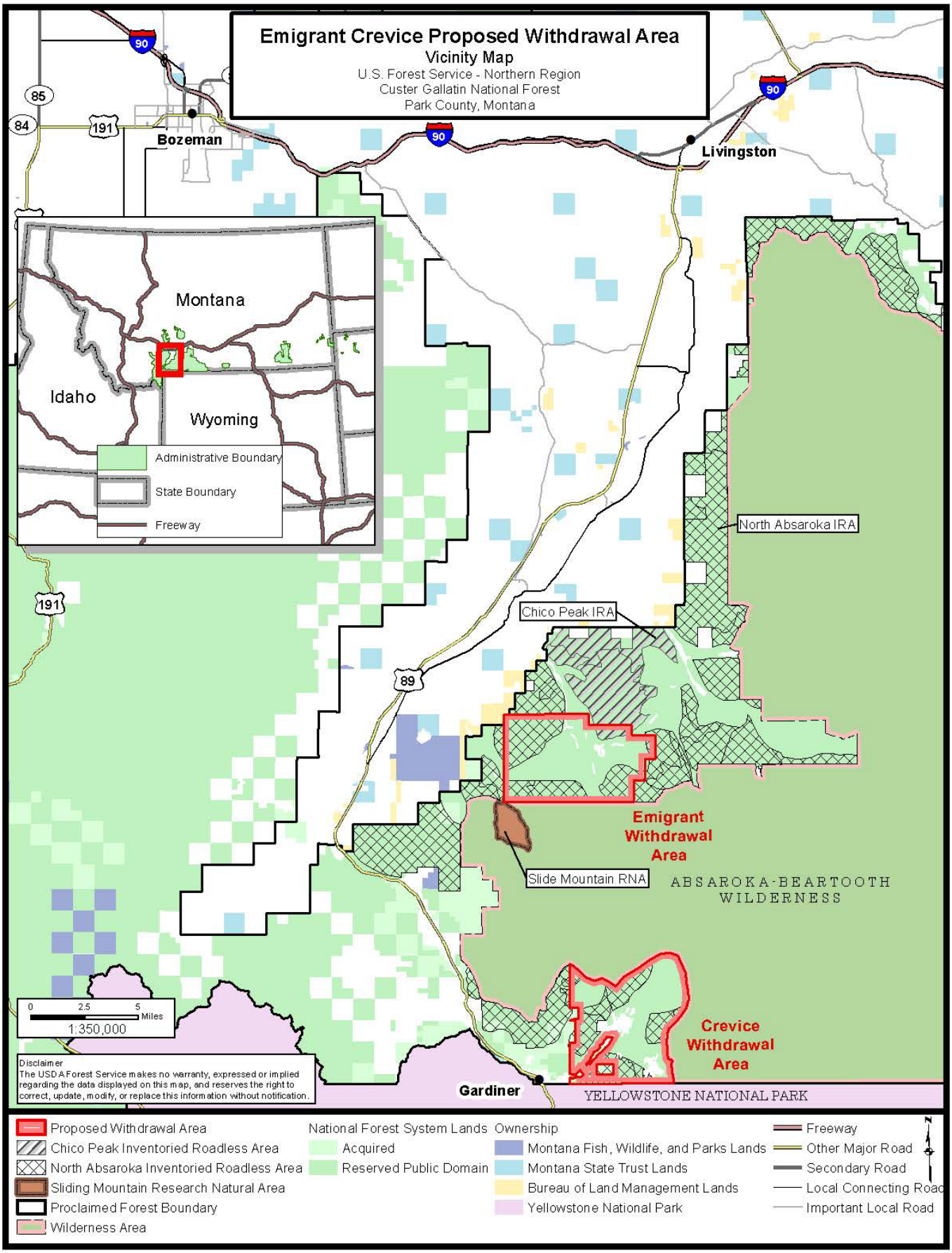
Title page photographs by Dan Seifert and Doug Madsen (2017).

Figure 1. Vicinity map displaying the proposed Emigrant and Crevice minerals withdrawal areas, in relation to Yellowstone National Park, the Absaroke-Beartooth Wilderness, North Absaroka IRA, Chico Peak IRA, and the Sliding Mountain RNA (facing north).



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Common Acronyms Used

ABSA – Absaroka-Beartooth Study Area
BEA – U.S. Bureau Economic Analysis
BE – Biological Evaluation
BLM – Bureau of Land Management
CFR – Code of Federal Regulations
CGNF – Custer Gallatin National Forest
DEQ – Department of Environmental Quality
EA – Environmental Assessment
EO – Executive Order
ESA – Endangered Species Act
FLPMA – Federal Land Policy and Management Act
FONSI – Finding of No Significant Impact
Forest Plan – Gallatin National Forest Land and Resource Management Plan
FSH – Forest Service Handbook
FSM – Forest Service Manual
HUC – Hydrologic Unit Code
IRA – Inventoried Roadless Areas
MA – Forest Plan Management Area
Montana DEQ – Montana Department of Environmental Quality
MFPW – Montana Department of Fish, Wildlife, and Parks
MTHP- Montana Natural Heritage Program
MIS – Management Indicator Species
NEPA – National Environmental Policy Act
NFS – National Forest System
NRCS – Natural Resources Conservation Service
NRHP – National Register of Historic Places
OHV – Off Highway Vehicle
PCE – Primary Constituent Elements
pH – Potential of Hydrogen
PLO – Public Land Order
RFD – Reasonable Foreseeable Development
RMP – Resource Management Plan (BLM)
RNA – Research Natural Area
ROS – Recreation Opportunity Spectrum
ROW – Right of Way
TMDLs – Total Maximum Daily Load
TES – Threatened, Endangered, Sensitive
USDA – U.S. Department of Agriculture
USDOI – U.S. Department of Interior
USFS – U.S. Forest Service
USFWS – U.S. Fish and Wildlife Services
USGS – U.S. Geological Survey
VQO – Visual Quality Objective
YCT – Yellowstone Cutthroat Trout

Section 1: Introduction

1.1 Introduction

The General Mining Act of 1872, as amended, [30 United States Code (USC) 22–54] (Mining Law) allows for the exploration and mining of certain minerals and establishment of mining claims by U.S. Citizens on federal public lands, unless an area is formally withdrawn from mineral entry. On November 22, 2016, the Department of the Interior, Bureau of Land Management (BLM) published a *Federal Register* notice that the Forest Service filed an application to formally withdraw approximately 30,370 acres of National Forest System (NFS) lands from mineral entry within the project area (Figure 1 pg. iii). The proposed withdrawal would be for a 20 year term and is subject to valid existing mineral rights. The proposed withdrawal does not include exclusion from leasing or geothermal laws.

Publication of the *Federal Register* notice additionally segregated[1] for two years, the lands described in the, *Application for Withdrawal: Emigrant and Crevice Area* (Appendix A, exhibit 1 pp 6-9) from location and entry under Mining Laws. This two year time frame is being used to complete various studies and analyses of resources in the area proposed for withdrawal, including this environmental review of the proposed withdrawal as required by the National Environmental Policy Act of 1969, as amended [42 USC 4321–4347] (NEPA).

This Environmental Assessment (EA) is intended to aid in recommendations and meet public disclosure requirements. This assessment incorporates by reference information that is reasonably available to the public. This EA satisfies the requirements outlined at 36 CFR 220.7 and 43 CFR 2310.3-2. Pursuant to 40 CFR 1508.5 the Forest Service has designated the BLM as a cooperating agency (FS Agreement Number 17-MU-11011100-037).

1.2 Project Location

The proposed withdrawal is entirely within the Custer Gallatin National Forest, Park County, Montana (Figure 1). The boundaries and interior lands of the proposed withdrawal contain approximately 30,370 acres of federal lands minerals and approximately 1,668 acres of non-federal minerals, verified by a land survey report on December 12, 2016. The proposed area consists of two parcels: Emigrant (15,795 acres of NFS lands) within the Yellowstone Ranger District and Crevice (14,575 acres of NFS lands) within the Gardiner Ranger District. Both the proposed Emigrant and Crevice withdrawal areas are adjacent to the Absaroka-Beartooth Wilderness as designated by Congress in 1978 (PL 95-249) (modified in 1983 by PL 98-140 and again in 1984 by PL 98-550). No portions of either area lie within designated wilderness.

There are approximately 1,668 acres of non-Federal lands and non-Federal mineral rights that are within the project area boundary. The proposed mineral withdrawal would not apply to these private lands and minerals. However, if title to these non-Federal lands or non-Federal mineral rights are subsequently acquired by the United States, the acquired lands and/or mineral rights would become subject to the terms and conditions of the proposed withdrawal if the withdrawal is in effect.

[1] Segregation means the removal for a limited period, subject to valid existing rights, of a specified area of public lands from the operation of the public land laws, including the mining laws, pursuant to 43 CFR 2300.0-5.

The proposed Emigrant Crevice withdrawal area contains four historic mining districts - Emigrant, Mill Creek, Crevice, and Jardine. The proposed withdrawal area has a long history of mineral prospecting, exploration, development, and production. There are numerous abandoned mine land features (adits, shafts, mill sites, dumps, etc.) scattered throughout this area. With consideration to the geologic setting and past mineral development within the proposed withdrawal area, the most likely major locatable mineral deposits of interest include gold (placer and lode), copper, molybdenum, and silver. Other mineral commodities that may be of interest in the future include lead, zinc, tungsten, and arsenic.

Of the non-federal land, almost all is patented mining claims, on which the majority of historic mining activity has occurred within this area. The patented lands are relatively central within both the Emigrant and Crevice parcels and generally coincide with the areas having the highest known mineral development potential. Current unpatented mining claims within the proposed withdrawal area tend to surround the patented claim blocks, and consist of 226 lode claims (4,669 acres), 3 placer claims (159 acres), and 6 mill site claims (30 acres).

Emigrant

The proposed Emigrant area (Figure 2) is located 26 miles south of Livingston, Montana. The proposed area encompasses the Emigrant Creek drainage, as well as, parts of the Mill Creek, Arrastra Creek, and Sixmile Creek drainages. The proposed area contains 15,795 acres of NFS federal minerals and 316 acres of non-federal minerals that would not be subject to the proposed withdrawal, unless obtained by the federal government in the future.

Crevice

The proposed Crevice withdrawal area (Figure 3) lies in the Bear Creek drainage adjacent to the northern boundary of Yellowstone National Park (Yellowstone National Park) and to the east and northeast of Gardiner, Montana. The proposed area contains 14,575 acres on federal minerals. The propose areas contains 1,352 acres of non-federal minerals that would not be subject to the proposed withdrawal, unless obtained by the federal government in the future.

The proposed Crevice withdrawal area contains three existing withdrawals. The first existing withdrawal was created by Executive Order 3053 (EO), dated February 28, 1919, and contains 4,117 acres that are withdrawn from surface entry and non-metalliferous mineral entry to serve as a game preserve. The second existing withdrawal is Power Site Reserve 527, dated March 28, 1916, and contains 184 acres that are withdrawn from surface disposal and reserved for water power sites (43 CFR 2091.5-4). The final existing withdrawal is Power Site Classification 94, dated May 2, 1925, 104.93 acres of this withdrawal lie within the boundary of the proposed project area. These areas are only withdrawn from surface disposal (43 CFR 2091.5-4). Since none of the existing withdrawals close the land to entry under the mining laws, the proposed Crevice withdrawal area would overlap these existing withdrawals if approved.

Figure 2. Map displaying the proposed Emigrant withdrawal area and approximate locations of unpatented mining claims (facing north).

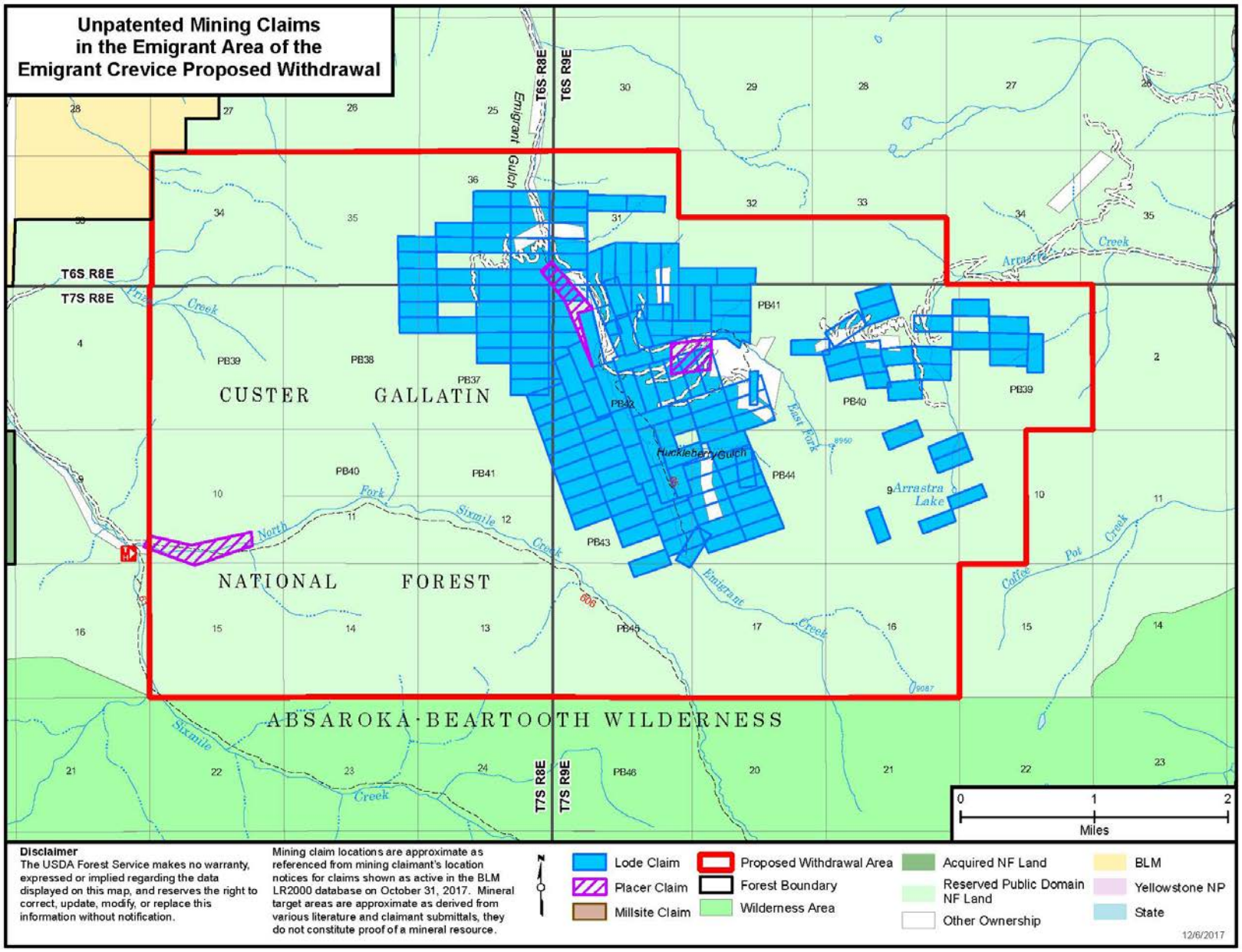
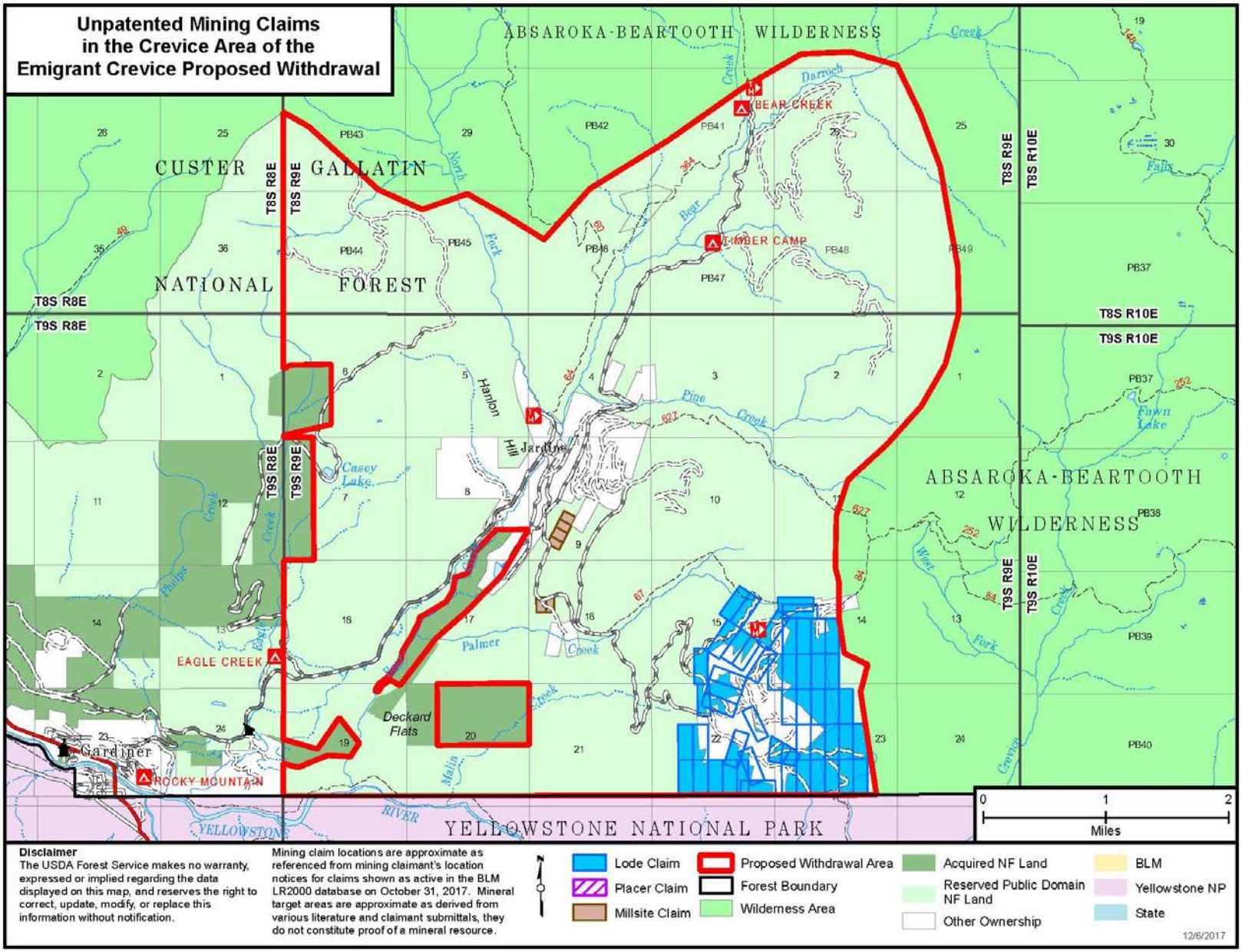


Figure 3. Map displaying the proposed Crevice withdrawal area and approximate location of unpatented mining claims (facing north).



1.3 Purpose of and Need for Action

As detailed in the application (Appendix A) submitted by the US Forest Service to the BLM, the underlying purpose is to protect and preserve the scenic integrity, important wildlife corridors, and high quality recreation values of the Absaroka-Beartooth Wilderness, within portions of the North Absaroka and Chico Peak Inventoried Roadless Areas, as well as, the Sliding Mountain Research Natural Area from location and entry under the United States mining law.

A withdrawal of the approximately 30,370 acres of National Forest System lands in the historic Emigrant mining district and the Jardine/Crevice mining district is needed to protect and preserve the scenic integrity, important wildlife corridors, and high quality recreation values contained in these lands.

These areas provide a unique combination of special places and outstanding resource values directly north of Yellowstone National Park. As part of the Greater Yellowstone ecosystem, the proposed withdrawal area provides important wildlife habitat and corridors for grizzly bear, Canada lynx, and a variety of other wildlife species. Similarly, the area exhibits high quality outdoor recreation values because of its spectacular scenery, scenic integrity, abundance of wildlife and relatively undisturbed characteristics, the maintenance of which is significant to the local economy. The area requested for withdrawal is also the headwaters of a number of streams that eventually flow into the Yellowstone River. Maintenance of water quality and high value aquatic resources are important economic values for local recreational fisheries and uses.

1.4 Decision Process

The United States Department of Interior (USDOI) BLM manages the subsurface mineral resources on public lands administered by the Forest Service. Section 204 of the Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1714(c)) gives the Secretary of the Interior authority to make, modify, extend, or revoke most withdrawals on public or reserved Federal lands. In October 2016 the Forest Service applied to the Secretary of the Interior for withdrawal actions on NFS lands (Forest Service Manual (FSM) 2761.01) in the Emigrant and Crevice areas. The BLM accepted this application and published notice of an application for withdrawal in the Federal Register along with a segregation order on November 22, 2016. Publication of this notice temporarily segregates the lands for up to two years from location and entry under the United States mining laws while the withdrawal application is being processed.

This EA is not a decision document. Based upon the effects of the alternatives, the recommending Forest Service official will transmit a recommendation to the BLM. The recommending Forest Service official for this assessment is the Northern Region Regional Forester (FSM 2761.04). The decision document is the public land order (PLO) or notice of denial, issued from the Secretary of the Interior, pursuant to the FLPMA. This proposal is not subject to objection under Forest Service regulations at 36 CFR 218 because the Forest Service is making a recommendation to another Federal agency. Additionally, there will be no BLM administrative review since the decision is made by the Secretary of Interior.

1.5 Analysis Framework

Forest Plan Consistency

This EA tiers to and incorporates by reference the Gallatin National Forest Land and Resource Management Plan Final Environmental Impact Statement (FEIS) and follows the Gallatin National Forest Land and Resource Management Plan (Forest Plan) 1987, as amended. The Forest Plan provides over-arching goals for multiple use stewardship of NFS lands within the Gallatin National Forest unit boundary (Forest Plan Chapter 2). Based on the proposed action's stated purpose and need, the relevant goals from the Forest Plan are tied to providing forest visitors with visually appealing scenery, providing a broad spectrum of recreation opportunities in a variety of forest settings, and providing sufficient habitat for recovered populations of threatened and endangered species (i.e. grizzly bear, bald eagle, and peregrine falcon.)

Proposed projects are required to be in compliance with the Forest Plan goals and standards, or a Forest Plan amendment is required. Neither alternative would require a Forest Plan amendment. The proposed action complies with the objective for minerals withdrawals (Objective J. Forest Plan, pg. II-5) and the Forest wide standard that, "future withdrawals from minerals entry will be evaluated based on the criteria contained in the 43 CFR 2310 and section III of Appendix D" (Forest Plan, pg. II-28). Appendix D is titled Minerals Management and sets the following evaluation criteria for proposed withdrawals (Forest Plan, pg. D-3):

1. Are there other ways available to protect the resources values? (Section 2.2 Alternative A: No Action)
2. Are the values at risk of such a nature that a significant financial, social, or cultural loss could occur? (Section 3: Affected Environment and Section 4: Environmental Consequences)
3. Does the withdrawal area have a high mineral potential or are there nearby mining claims or mining activities? (Section 3.1 Minerals)

This assessment, and associated project record, will provide a basis for the recommending official and the Secretary of Interior to evaluate these questions.

The Forest Plan provides designation of management areas (MA), each with specific goal(s) and standards. For some MAs the Forest wide standards are utilized in lieu of MA specific standards. Table 1 displays the applicable Forest wide standards for this proposed mineral withdrawal. Table 2 provides the relevant MA specific goal(s) and standards for each of the MA for the proposed project areas. These MA specific goal(s) and standards are in addition to the Forest wide goals and standards.

Table 1. Applicable Forest wide standards from the Forest Plan for the proposed mineral withdrawal.

Resource Area	Applicable Forest Wide Standards
Recreation	- Dispersed recreation use will be managed to provide users with a wide range of opportunities to meet increasing demand while protecting forest resources.
Visual Quality	- Environmental analysis and project designs for landscape altering activities will be evaluated to determine if they are compatible with the assigned VQOs. Landscape altering projects shall meet the assigned VQOs, or in locations where the existing situation does not meet the VQO, shall not further degrade the visual condition.
Cultural Resources	- Projects will be designed to avoid or minimize adverse impacts on significant cultural resources.

Resource Area	Applicable Forest Wide Standards
	- Provisions of the Antiquities Act, National Historic Preservation Act, American Indian Religious Freedom Act, the procedures outlined in 36 CFR 800 and EO 11593 will be complied with.
Wildlife and Fish	- Habitat for Regionally designated sensitive species on the Gallatin NF will be maintained in a suitable condition to support these species. - The Forest will be managed to maintain and, where feasible, improve fish habitat capacity in order to achieve cooperative goals with the Montana Department of Fish, Wildlife, and Parks and to comply with State water quality standards.
Threatened and Endangered Species	- The Final Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area (Interagency Conservation Strategy Team 2007), will be followed in maintaining or improving habitat, minimizing human/grizzly bear conflict potential, and guiding resource management activities. - The GYA Grizzly Bear Conservation Strategy will be followed to evaluate grizzly bear habitat and mortality risk. - Maintain or restore lynx habitat connectivity in and between LAUs, and in linkage areas.
Water and Soil	- Comply with EO 11990 (Protection of Wetlands) and Forest Service, policy in FSM 2500.
Minerals (Locatable)	- All claimants will be required to submit a Notice of Intent before conducting exploration activities. An operating plan which meets State and federal standards may be required. - The type of access approved in a plan of operations under 36 CFR 228 will be consistent with the stage of exploration or development and will be in accordance with management area goals.
Minerals (Withdrawals)	- Recommendation for withdrawals to be revoked, revoked/noted in public record and continued will follow the requirements outlined in Section 204 of the FLPMA (PL 94-579) and 43 CFR 2310.

Table 2. Relevant management area specific goal(s) and standards from the Forest Plan for the proposed mineral withdrawal. These management area specific goal(s) and standards are in addition to the Forest wide goals and standards.

Management Areas (MA) and acres within the proposed withdrawal areas	Relevant Management Goal(s) and Standards
MA 3 –10,051 acres	**Management Goal:** - Managed essentially in their present condition to protect existing improvements and resources, with minimal investment for resource activities. **Relevant Standards**: - A variety of recreation opportunities exist but no new developments will be made. - The visual quality objectives range from retention to partial retention.
MA 13 – 7,813 acres	**Management Goals**: - Manage vegetation to provide habitat necessary for the continued recovery of the grizzly bear. - Meet State water quality standards and maintain stream channel stability. **Relevant Standards**: - The visual quality objective will range from partial retention to modification. - Limit mineral activities to specific area or periods to reduce mortality risk and reduction in habitat effectiveness.
MA 14 –4,882 acres	**Management Goal:** - Maintain and/or enhance big game habitat. **Relevant Standards**: - The visual quality objective is partial retention. - Limit mineral activities to specific areas or periods to reduce grizzly bear mortality risk and maintain elk habitat quality.
MA 15 –7,434 acres	**Management Goals:** - Meet grizzly bear mortality reduction goals as established by the Interagency Grizzly Bear Committee.

Management Areas (MA) and acres within the proposed withdrawal areas	Relevant Management Goal(s) and Standards
	- Manage vegetation to provide habitat necessary for the continued recovery of the grizzly bear. **Relevant Standards**: - The visual quality objective ranges from retention to partial retention. - Limit mineral activities to specific areas or periods to reduce grizzly bear mortality risk and maintain elk habitat quality.
MA 17 –390 acres	**Management Goal:** - Maintain or improve vegetative conditions and forage production for livestock and wildlife use. **Relevant Standards**: - Provide a variety of hunting opportunities. - The visual quality objective is partial retention.
MA 26 –39 acres	**Management Goal:** - Provide and maintain sites and facilities necessary for the administration of Gallatin National Forest lands. **Relevant Standards**: - The visual quality objective is partial retention. - Surface occupancy will not be permitted for mineral leases.

43 Code of Federal Regulation 2301.3-2

Specific regulation requirements for analysis' of minerals withdrawals are detailed within 43 CFR 2310.3-2. Below is a summary of the regulations with information on where within this EA or is corresponding project record the required information may be obtained. 43 CFR 2301.3-2 states:

(a) The qualifications of all specialists utilized by either the authorized officer or the applicant to prepare the information, studies, analyses and reports shall be provided.

- *EA Appendix B: List of Preparers*

(b)(1) A report identifying the present users of the lands involved, explaining how the users will be affected by the proposed use and analyzing the manner in which existing and potential resource uses are incompatible with or conflict with the proposed use of the lands and resources that would be affected by the requested action.

- *EA sections 3.1 Minerals, 3.2 Scenic Resources, 3.3 Recreation Resources, 3.6 Hydrology, and 3.8 Economics identify present users of NFS lands proposed for withdrawal.*
- *EA sections 4.1 Minerals, 4.2 Scenic Resources, 4.3 Recreation Resources, 4.6 Hydrology, and 4.8 Economics provide information how users would be affected by the proposed withdrawal.*
- *Provisions of § 2310.3-5 (compensation for improvements) do not apply because there are no improvements on lands impacted.*

(b)(2) If the application states that the use of water in any State will be necessary to fulfill the purposes of the requested withdrawal, extension or modification, a report specifying that the applicant or using agency has acquired, or proposes to acquire, rights to the use of the water in conformity with applicable State laws and procedures relating to the control, appropriation, use and distribution of water, or whether the withdrawal is intended to reserve, pursuant to Federal law, sufficient unappropriated water to fulfill the purposes of the withdrawal.

- *Withdrawal Application (Appendix A) page 3, number "13. WATER NEEDS: Water will*

not be required to fulfill the purpose of the requested withdrawal action."

(3) An environmental assessment, an environmental impact statement or any other documents as are needed to meet the requirements of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(C)), and the regulations applicable thereto.

- *EA page 1, "This EA satisfies the requirements outlined at 36 CFR 220.7 and 43 CFR 2310.3-2".*

(3)(i) A report on the identification of cultural resources prepared in accordance with the requirements of 36 CFR part 800, and other applicable regulations.

- *EA section 3.9 Heritage Resources and draft Cultural Resources report.*

(3)(ii) An identification of the roadless areas or roadless islands having wilderness characteristics, as described in the Wilderness Act of 1964 (16 U.S.C. 1131, et seq.), which exist within the area covered by the requested withdrawal action.

- *EA section 3.3 Recreation Resources subheading Wilderness, Research Natural Areas, and Inventoried Roadless Areas, and draft Recreation Resources report.*

(3)(iii) A mineral resource analysis prepared with information on: General geology, known mineral deposits, past and present mineral production, mining claims, mineral leases, evaluation of future mineral potential and present and potential market demands.

- *EA section 3.1, 4.1 Minerals, EA Appendix C: Mineral Commodity Summaries, and draft Reasonable Foreseeable Development Scenario report.*

(3)(iv) A biological assessment of any listed or proposed endangered or threatened species, and their critical habitat, which may occur on or in the vicinity of the involved lands, prepared in accordance with the provisions of section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536), and regulations applicable thereto, if the Secretary determines that assessment is required by law.

- *EA sections 4.4 Terrestrial (wildlife) Species, 4.5 Botanical Species, and 4.7 Aquatic Species provide summaries of effects determinations for both the proposed action and the no action alternative.*
- *Biological Evaluations for aquatic, terrestrial, and botanical species are contained within the project record; draft Water/Aquatic Biota Resource report, draft Wildlife Resources report, and draft Botanical Resources report, respectively.*
- *No biological assessment is needed because no site-specific actions have been proposed; the proposal is an administrative action with no ground disturbing activities. Because there is a determination of no effect to any ESA species (aquatic, terrestrial, or botanical) there is no required ESA consultation, at this time.*

(3)(v) An analysis of the economic impact of the proposed uses and changes in use associated with the requested action on individuals, local communities, State and local government interests, the regional economy and the Nation as a whole.

- *EA sections 3.8 and 4.8 Economics, and draft Economic Resources report.*

(3)(vi) A statement as to the extent and manner in which the public participated in the environmental review process.

- *EA section 1.6 Public Participation and Section 5: Agencies and Individuals Consulted.*

(4)(i) Whether the lands involved are floodplains or are considered wetlands; and-

- *EA section 3.6 Hydrology subheading Wetlands and Floodplains and draft Water/Aquatic Biota Resource report.*

(4)(ii) Whether the existing and proposed uses would affect or be affected by such floodplains or wetlands and, if so, to what degree and in what manner.

- *EA section 4.6 Hydrology and draft Water/Aquatic Biota Resource report.*

(5) A statement of the consultation which has been or will be conducted with other Federal departments or agencies; with regional, State and local Government bodies; and with individuals and nongovernmental groups regarding the requested action.

- *EA Section 5: Agencies and Individuals Consulted.*

1.6 Public Participation

The public participation for this project follows two regulatory processes. The first process, a 90-day comment period, is required for the USDOIs proposed withdrawal notice in the *Federal Register*, as specified by 43 CFR 2310.3-1(b). The second process is required by the Forest Service and BLM NEPA regulations (36 CFR 220 and 43 CFR 46, respectively). In addition a separate comment period was provided for entities and individuals with active claims or privately owned lands within the proposed withdrawal areas

Federal Register Comment Period

The notice of proposed withdrawal was published in the *Federal Register* on November 22, 2016 and initiated a 90-day public comment period, which ended February 21, 2017. Comments could be submitted to the Custer Gallatin Forest Supervisor or the BLM Montana State Office. A public meeting was held on January 18, 2017 to provide information regarding the proposed withdrawal and provided an opportunity for verbal comments or submission of written comments. Approximately 90 people attended the meeting. The meeting date, time, and location and legal description for the proposed withdrawal was included in the *Federal Register* notice as well as a notice appearing in the *Bozeman Daily Chronicle* on January 10, 2017.

NEPA Public Comment Periods

This project first appeared on the Custer Gallatin National Forest's schedule of proposed actions (SOPA) on March 7, 2017 and has continued to appear, and be updated, since that date. On June 16, 2017 the Forest Service initiated a 30-day public scoping period. Previous commenters, public meeting attendees, and other known interested parties were notified by email or direct mailings explaining where to find more information about the project and how to comment. In addition a scoping letter was sent to Tribal partners, Congressional delegates, State and local representative and agencies and known interested groups. For more information on coordination with Tribal partners see *Section 5: Agencies and Individuals Contacted.*

As part of the NEPA public participation process a 30-day notice and comment period will occur upon the release of this EA to the public via a legal notice in the *Bozeman Daily Chronicle*. This comment period satisfies both Forest Service and BLM NEPA requirements. Website information and notification of EA and 30-day comment period will be sent to interested parties that have been identified through the 90-day Federal Register period, public meeting, and 30-day scoping period.

Mining Claimant Letter

Outside of the 90-day *Federal Register* notice and 30-day scoping period, a separate notification and opportunity to comment was provided for those entities and individuals with active claims or privately owned lands within either of the proposed withdrawal areas. This letter was sent to these entities and individuals with active claims on August 30th, 2017, notifying them of the proposed withdrawal and requesting any information that claimants would be willing to provide related to known mineralization or mineral development plans. Six responses were received and reviewed for proprietary information and are part of the public record.

Public Comments Received

Over 100,000 comments were received in oral and written form, ranging from form letters or petitions to lengthy testimonials. All comments submitted during the 90-day comment period and 30-day scoping periods have become part of the administrative record and are available for public review on project website's online reading room at https://cara.ecosystem-management.org/Public//ReadingRoom?Project=51258.

Most commenters voiced strong endorsement of the proposed withdrawal for protection of terrestrial wildlife habitats, aquatic habitats, heritage resources, visitor experiences, recreational activities, and the protection of public lands for future generations. The *Affected Environment* section provides descriptions of natural resource values found within the proposed withdrawal areas, while the *Environmental Consequences* section discloses the impacts of the proposed withdrawal (Alternative B) and the no action alternative (Alternative A) to these resources.

Specific comments were received asserting that current Forest Service, BLM, and State regulations would offer the sought after protections for the areas from perceived negative effects of locatable mineral extraction. The no action alternative (Alternative A) considers this concept of utilizing the current regulations and guidance in 36 CFR 228 Subpart A and that a NEPA compliance process would be completed, with public input, to analyze and disclose effects of future locatable minerals activities.

One comment opposed to the withdrawal stated that the proposal violates the Property Rights Implementation Act of 1998 and the Takings Clause of the Fifth Amendment of the United States Constitution. The proposed withdrawal action would not violate either the Property Rights Implementation Act of 1998 or the Taking Clause of the Fifth Amendment, since the proposed withdrawal is subject to valid existing rights. If valid existing rights were established for a current claim, the claimant would be free to request an authorized plan of operations under existing law, regulation and policy even if the area were to be withdrawn from mineral entry.

Comments determined to be outside the scope of this analysis

Numerous commenters emphasized the need for a permanent withdrawal of these lands. A permanent withdrawal would require congressional action and the Secretary of Interior does not have the authority to permanently withdrawal lands.

Statements indicating the Forest Service should not allow mining, of any kind, within the Yellowstone National Park boundary were submitted. The Forest Service is not the stewardship agency for the lands within Yellowstone National Park. National Park Service regulations prohibit mining in Yellowstone National Park. No lands within the proposed withdrawal areas are within any National Park boundary.

A comment was received stating that in 1978 Congress deliberately excluded the proposed withdrawal areas from the Absaroka-Beartooth Wilderness. While it is true that the proposed areas are not within congressionally designated wilderness, the congressional decision and legislation for designating the Absaroka-Beartooth Wilderness does not specifically speak to why other lands were not included within the designation.

A comment was received requesting the NEPA compliance document include a cumulative effects analysis of the two other NFS lands withdrawal applications (Okanogan Wenatchee NF and Boundary Waters Canoe Area Wilderness) that have been submitted to the BLM. Forest Service Handbook (FSH) 1909.15 outlines elements to consider when determining actions that are likely to contribute to a cumulative effects analysis: spatial and temporal boundaries are the two critical elements. Spatial and temporal boundaries set the limits of actions that are likely to contribute to a cumulative effect. The effects of actions must overlap in space and time for there to be potential cumulative effects. Because the two other proposed mineral withdrawals do not overlap in space, there cannot be a meaningful analysis of cumulative effects for these other proposed withdrawals.

Numerous comments were received concerning the effects of drilling and mining on the Yellowstone Caldera. Since neither of the proposed withdrawal areas are within the Yellowstone Caldera nor propose drilling or mining, this concern is outside the scope of this analysis.

Section 2: Proposed Action and Alternatives

Section 2 provides detailed descriptions of the no action (Alterative A) and proposed action (Alternative B) alternatives, as well as alternatives that were considered but removed from detailed study.

2.1 Elements Common to both Alternatives

Neither the no action (Alternative A) nor the proposed action (Alternative B) alternatives propose ground disturbing activities. Other NFS land management activities would not affected by either alternative. All NFS activities currently consistent with the Forest plan, applicable laws and regulations could continue, including public recreation and other Forest Service management activities. Neither alternative will have an effect on rights-of-way or access to non-federal lands within the areas proposed for withdrawal.

Private Land Minerals Development

Mineral activities on private lands can occur regardless of the two year segregation or alternative selected. Montana DEQ is the state permitting authority for locatable (hard rock and open-cut) mineral activity on private lands. Anticipated private lands mineral activities in the proposed withdrawal area include:

- Lucky Minerals exploratory drilling on private land within the proposed Emigrant withdrawal area.
- Crevice Mining Group Small Miners Exclusion Statement activities, which could include mining operations on private lands that impact 5 acres or less (https://deq.mt.gov/Portals/112/Land/Hardrock/Documents/pdfs/smesRequire.pdf?ver=2015-12-22-165312-480&timestamp=1473970985808).
- There are existing NFS road use permits that allow private land owners to access private lands and maintained NFS roads for access to patented mining claims.

Conservation Easement

In August 2017, TVX Mineral Hill, Inc. entered into an agreement with the Rocky Mountain Elk Foundation to set aside, in perpetuity, 549 acres of TVX's patented mining claims around the Mineral Hill Mine, within the proposed Crevice withdrawal area. The agreement placed the private lands into a conservation easement restricting them from future locatable mining operations. There would be no future mineral activity in that 549 acre area regardless of the selected alternative.

2.2 Alternative A: No Action

Under the no action alternative (Alternative A), the Secretary of Interior would not withdraw any of the federal lands or minerals identified in the *Notice of Proposed Withdrawal* from location and entry under the Mining Law. On November 22, 2018 the proposed withdrawal areas (Figures 2 and 3) would become, and remain until further notice, open to location and entry under the Mining Law and additional mining claims could be located. Federal public domain minerals and mining claims would continue to be managed by the BLM. The Forest Service and Montana DEQ would continue to oversee locatable mineral exploration and development and manage surface resources in accordance with their existing programs, policies, and regulations. The mitigation of potential effects from exploration, development, and operations would continue under the Forest Service regulations at 36 CFR 228A, the Forest Plan, and other applicable Federal and State laws,

regulations and policies.

Currently there are no pending or approved plans of operations for locatable minerals activities on Forest Service lands in either the proposed Emigrant or Crevice areas. Specific details and effects of future proposed mining plans of operations will not be analyzed in detail, within this EA. Site-specific environmental analysis for any future projects are beyond the scope of this analysis because such future projects have not yet been proposed. In the event of future mineral exploration or development proposals are submitted, applicable law/regulation/policy would likely require development of alternatives, project design criteria, and mitigation measures.

2.3 Alternative B: Proposed Action 20 year Mineral Withdrawal

As detailed in the *Federal Register Notice* and the application submitted to BLM (Appendix A), the proposed action would withdraw for 20 years, approximately 30,370 acres of NFS lands from location and entry under the United States mining laws, but not from leasing under mineral and geothermal laws. This would prohibit the location of new mining claims under the Mining Law. The withdrawal would be subject to valid existing rights in the area. Currently, no valid existing rights have been evaluated for unpatented mining claims in the proposed withdrawal areas.

The private lands and NFS lands within the boundaries with non-federal mineral estate would not be subject to the proposed withdrawal. However, if these lands were ever acquired by the Federal government through means such as donation, sale or exchange, they would be subject to the withdrawal and closed to locatable mineral exploration and development, if the withdrawal were in effect at that time.

Valid Existing Rights

The proposed withdrawal would be subject to valid existing rights within the area. A validity determination is a separate process from this analysis, where the Forest Service conducts a mineral examination in accordance with direction provided in BLM Manuals 3060 and 3891 and BLM Handbooks H-3890-1 and H-3890-3. The Forest Service would need to ensure that valid existing rights have been established prior to allowing mineral activities in congressionally designated or other withdrawn areas (FSM 2803.5 and BLM Manual 3809-1).

To constitute a valid existing right on a claim that would allow for mining activities in an area despite a segregation or withdrawal from the Mining Law, a mining claim must be valid as of the date of the segregation or withdrawal (November 22, 2016), and must continue to be valid from that date forward without substantial interruption until validity is determined. A valid lode or placer claim must meet both the Prudent Person Rule and the Marketability Test, be appropriately located and maintained, meet all other legal and regulatory requirements, and be determined to have valid existing rights. A mining claim with valid existing rights gives the claimant the right to possess and develop the mineral deposit. This right has to be exercised in compliance with all applicable Federal, state laws, regulations, and rules.

Mill site claims on segregated and/or withdrawn lands are also subject to valid existing rights prior to approved use. Mill sites (dependent and independent) located prior to a withdrawal must be valid both at the date of the withdrawal and must continue to be valid without substantial interruption from that date forward until validity is determined.

The process for determining valid existing rights must be conducted by a certified mineral examiner. The findings in the mineral examiners report would either (1) recognize that the claim(s) has valid existing rights and that the NOI or plan of operations should be processed, or (2) recommend initiating contest charges against the claim through the BLM, subject to their technical approval of the report. The process for determining valid existing rights is outside the scope of this environmental analysis.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

Sometimes alternatives are suggested or proposed that on examination do not adequately respond to the purpose and need for action, are technically or economically cost prohibitive, are not ripe for consideration, are remote or speculative, are substantially similar in design to an existing alternative, would have substantially similar effects as an existing alternative, or the authority does not exist to approve such actions (FSH 1909.15, Section 14.4). In such cases, these alternatives are usually eliminated from detailed analysis. Alternatives that were considered and eliminated from detailed analysis are described below, along with the rationale for their elimination.

Permanently Withdraw the Lands from Minerals Location and Entry

During public comment it was requested that a permanent withdrawal be implemented instead of the proposed 20 year withdrawal. The rationale for this alternative is that the protection and preservation of scenic integrity, important wildlife corridors, and high quality recreation values is a longer term need and should be address with a longer, more permanent, timeframe. This alternative was considered but eliminated from detailed analysis because a permanent withdrawal would require congressional action and the Secretary of Interior does not have the ability to implement a withdrawal for more than 20 years for areas aggregating more than 5,000 acres [FLPMA Section 204(c)]. Administrative withdrawals made by the Secretary of Interior under the authority of FLPMA are renewable as long as the underlying reason for the withdrawal is still valid.

Congress is currently considering a similar proposal under the legislative process, which is the appropriate venue for such an action, The Yellowstone Gateway Protection Act, (S-941 and H.R-4644). This Act proposes to permanently withdraw certain NFS lands in the Emigrant and Crevice areas, from all forms of mineral entry, appropriation, leasing, or disposal under public land laws, subject to valid existing rights. While Congress considers legislation to permanently withdraw these areas, the Forest Service and BLM are continuing to move forward with their assessment.

Change the Mining Law

Comments received suggested that reforming or changing the 1872 Mining Law, as amended, would address potential environmental impacts to the proposed Emigrant and Crevice areas. While the Mining Law is fundamentally a law for acquiring property rights, rather than an environmental law, presumably the comments were directed at eliminating the ability to establish property rights and increasing agency discretion to prevent mining. This alternative was eliminated from consideration because making or amending law is an explicit function of the Congress. Because an alternative to amend the Mining Law is not within the authority of the Forest Service, BLM, or Secretary of Interior it has been eliminated from detailed analysis.

Withdrawal Either Emigrant or Crevice, but not both

The idea of analyzing the withdrawal for one of the areas, either Emigrant or Crevice, but not both was discussed. This idea was not developed into a standalone alternative because it would not meet the stated purpose and need for the protection and preservation of both the Emigrant mining district and the Jardine/Crevice mining district's scenic integrity, important wildlife corridors, and high quality recreation values described in the application as submitted (Appendix A). In addition a partial withdrawal is contained within the proposed action and the decision maker (Secretary of Interior) has the authority to approve or deny the proposed action in part or in whole.

Use the Current Regulations for Plans of Operations for Protection
Requests for an alternative that would continue to allow the areas to be open to location and entry under the Mining Law and allow new mining claims to be located, that would be subject to the Forest Service and BLMs current programs, policies, and regulations were received. This request is contained within the no action alternative (Alternative A).

Should future mineral development activities be proposed, the Forest Service and Montana DEQ would continue to oversee locatable mineral exploration and development and manage surface resources in accordance with their existing programs, policies, and regulations. The mitigation of potential effects from exploration, development, and operations would continue under the Forest Service regulations at 36 CFR 228A, the Forest Plan, and other applicable Federal and State laws, regulations and policies.

Consider Withdrawing the Lands from Leasable and Geothermal Activities for 20 years
Approval of actions under the mineral leasing laws are discretionary, as such, lands may be closed or management limited to protect identified resource values. Should mineral or geothermal leasing proposals be received, the Forest Service has the discretion to address these requests in a separate environmental review process. As such considering withdrawing the proposed lands from leasable and geothermal activities were not added as an alternative to this project.

Section 3: Affected Environment

This section summarizes the existing condition for a number of resources. For each resource a description of the affected environment is presented, any relevant legal framework specific to the resource is discussed, along with an explanation of any analysis measures[2] that will be utilized in *Section 4: Environmental Consequences*, to evaluate impacts of both alternatives.

The affected environment (current condition) provides the baseline for evaluation and comparison between alternatives, and provides the decision maker with information needed to select an appropriate course of action. This section summarizes resource reports. Full versions of resource reports are available on request or can be downloaded from the project website at: https://www.fs.usda.gov/project/?project=51258.

Resources that are not affected by any of the alternatives and therefore, not addressed in this analysis include: general vegetation management, fire and fuels management, real estate rights of way, lands special uses, roads and transportation.

3.1 Minerals

Forest Plan Goal

Provide for orderly and environmentally acceptable exploration and development of minerals, oil and gas, and geothermal resources.

The proposed Emigrant Crevice withdrawal areas have a long history of mineral prospecting, exploration, development, and production. Since the 1870's, numerous geologists have devoted major efforts to geology and mineral deposits of this area, resulting in numerous geologic maps and studies (Montagne and Lageson 1995; Van Gosen 1993; Hammarstrom et al. 1993). The USGS includes the Emigrant district in a database compilation of "*the world's largest and most important porphyry-related deposits*" (USGS 1999). The Emigrant area has been estimated to contain 1.7 million tons of indicated and inferred resources within 13 main vein deposits (USGS 1983).

The proposed Emigrant and Crevice withdrawal areas are on the west edge of the Absaroka Beartooth Mountains and borders the Yellowstone River Valley. This area has been divided into four geographically and geologically distinct blocks of Archean rock: the main Beartooth massif, the North Snowy Block, the Stillwater Block, and the South Snowy Block (USGS 1983; Foose et al. 1961; Wilson 1936). The proposed Emigrant Crevice withdrawal area overlaps the South Snowy Block and adjacent Absaroka Volcanic Center (Figures 4 and 5). Rock units in this area represent the span of geologic time. Surface geology consists of Archean, Pre-Cambrian, Paleozoic, Mesozoic and Cenozoic aged rocks and the landscape is still being shaped by ongoing erosive forces.

Most of the Custer Gallatin National Forest's locatable mineral resources are found within the Absaroka-Beartooth study area (ABSA), (Hammarstrom et al. 1993). The ABSA contains gold, silver, copper, molybdenum, lead, and zinc resources in addition to essentially all of the identified resources of platinum-group elements (platinum, palladium, rhodium, ruthenium, osmium, and iridium) and 75 percent of the identified chromium resources in the U.S. (Hammarstrom et al. 1993). Mining in the ABSA began in the 1860's and continues today. The long history of mining in the ABSA is evidenced by hundreds to thousands of abandoned mine land features (adits, shafts, mill sites, dumps, drill sites, pits etc.) scattered across 16 mining districts.

[2] Analysis Measure- A quantitative or qualitative measure that shows the presence or state of a condition of trend for a particular forest resource area.

Present and Potential Market Demands
The USGS annually publishes Mineral Commodity Summaries that includes information on events, trends, and issues for each mineral commodity. Appendix C table C-1 provides a the Mineral Commodity Summary of present and potential market demand information for locatable minerals with high occurrence potential in the proposed Emigrant Crevice withdrawal area from USGS's 2017.

Analysis Measures

Mining Claims and Minerals Leases
The proposed Emigrant and Crevice withdrawal areas have 22 claimants holding approximately 235 unpatented mineral claims encompassing approximately 4,858 acres of NFS lands (BLM November 22, 2017). In addition to these unpatented claims on NFS lands, there are over 100 private parcels. Many of these private parcels are patented claims within the proposed withdrawal boundary.

Evaluation of Mineral Potential
Based on previously completed USGS Mineral Resource Assessments for the ABSA and Custer Gallatin National Forest, the likelihood of mineral occurrence and mineral development for the proposed Emigrant and Crevice withdrawal areas is rated with an overall high potential for both mineral occurrence and mineral development (Hammarstrom et al. 1993; Hammarstrom et al. 1998).

Emigrant
Numerous mineralized exploration and development targets associated with igneous intrusive centers have been identified in the proposed Emigrant withdrawal area (USGS 1983; Basler 1965; Berg et al. 2000). The proposed Emigrant withdrawal area hosts placer gold deposits as well as lode deposits of copper and molybdenum, which have been the subject of both small and large scale mining efforts from the late 1800s to present (Van Gosen 1993).

The proposed Emigrant withdrawal area is centered on one of multiple intrusive centers located on the Cooke City Structural Zone at its intersection with the Mill Creek Fault. This intersection is the locus for the emplacement of large intrusions that tend to have a zoned mineral distribution with a core of molybdenum with minor copper, a zone of copper-gold, and an outer zone of copper-silver-base metals (USGS 1983). Mineralization occurs as sulfide disseminations, breccia pipes, stock works, and veins containing the following minerals: gold, silver, copper, molybdenum, lead, zinc, arsenic, and tungsten (Figure 4). Bog iron deposits containing manganese also occur in the Emigrant and Mill Creek districts; however, the deposits appear to be too low grade and too small to support a conventional large-scale mining operation so will not be discussed further (USGS 1983).

Placer gold was first discovered in Emigrant Creek in 1863. Since then, this area has become known for containing the largest discovery of placer gold within the ABSA, with production in excess of four million metric tons of auriferous gravels (Hammarstrom et al. 1993). Most of the recorded mineral production in the Emigrant area occurred in the early 1900's as gold and silver with placer deposits yielding lesser amount of copper, lead, and zinc (Johnson et al. 1993). At the 2017 gold prices, the approximately 40,000 ounces of gold recovered from the Emigrant area would be worth over $50 million.

Since the early 1900's, there have been several episodes of mining and mineral exploration in the proposed Emigrant withdrawal area, resulting in approximately 21 patented claims. This area contains over 50 named small mines (i.e. prospects) and numerous other mineralized occurrences.

Some past mineral activities included surface and underground mapping, sampling, geophysical surveys, and drilling (83 drill holes totaling approx. 42,237 ft. from 1971 through 1992). The exploration results have led to several mineral assessments over the years, indicating numerous potential for mineral resources.

The Emigrant area has recently been the subject of two separate mineral exploration proposals in 2015. Lucky Minerals Inc. submitted a plan of operations to the Montana DEQ to conduct exploratory core drilling exploration activities at 23 locations on private patented mineral claims associated with the St. Julian and DUV properties. Montana DEQ has approved an Exploration Permit for Lucky Mineral's activities on privately owned lands. Lucky Minerals intends to post bond prior to the start of the 2018 field season. The company's plan of operations outlines intent to conduct exploration drilling in search of copper, gold, silver, and molybdenum. In association with this private lands exploration activity, Lucky Minerals obtained a road use permit from the Forest Service (October 2017) for their summer 2018 mineral exploration activities that will be conducted on private lands.

Additional, Lucky Minerals Inc. submitted a plan of operations for exploratory core drilling at 12 locations on lands managed by the Custer Gallatin National Forest in 2015. This submission was withdrawn by the company on November 25, 2015. There have been no subsequent requests for locatable minerals activities on NFS lands within the proposed Emigrant withdrawal area.

Despite no major development of deposits to date, there has been a sizable amount of exploration conducted in the proposed Emigrant withdrawal area with a noteworthy volume of resources identified. This lack of major development may be due to the areas steep slopes, which could necessitate higher underground mining costs, difficult access, processing challenges due to refractory properties of the mineralized rock, absence of extensive supergene enrichment, and low average copper grades (<0.5 percent) (Hammarstrom et al. 1993).

Mining Claims and Minerals Leases

As of November 2017, BLM records indicate there are approximately 173 unpatented mining lode claims and three unpatented placers claims in the proposed Emigrant withdrawal area. Currently, most of the claims previously explored (patented and unpatented) are held by Lucky Minerals, Inc.

There are no proposed or current federal minerals leases within the proposed Emigrant withdrawal area.

Evaluation of Mineral Potential

Locatable Minerals

The Emigrant area has a high potential for occurrence and development of undiscovered porphyry copper and molybdenum resources and for undiscovered gold (placer and lode), silver, lead, and zinc resources (Hammarstrom et al. 1993; Hammarstrom et al. 1998; McCullough 1999). The Emigrant Creek placer gold deposit represents the largest placer deposit found within the ABSA, and has the potential for identification of additional placer gold resources (Hammarstrom et al. 1993; Hammarstrom et al. 1998). Stotelmeyer and others (USGS 1983) estimated that over 1.5 million metric tons of auriferous gravels remain in shallow (<20 ft.) placer deposits in Emigrant Creek. The Emigrant area has been estimated to contain 1.7 million tons of indicated and inferred resources within 13 main vein deposits (USGS 1983).

Coal, Oil and Gas

The proposed Emigrant withdrawal area is not part of any defined Montana oil and gas province

(Hammarstrom et al 1993). The potential for the occurrence of coal, oil and gas resources in the portions of the ABSA that include the proposed Emigrant withdrawal areas is low due to the absence of rock formations that could act as hydrocarbon sources or reservoirs.

Geothermal

There are no known geothermal resources in the Emigrant withdrawal area, nor are there any mapped geologic structures or rock units conducive to geothermal resource occurrence or development. The potential for the occurrences of geothermal resources is low. Hydrogeological evidence does not suggest any direct connection between groundwater in the Emigrant Creek sub watershed and the geothermal spring systems feeding Chico Hot Springs and Yellowstone National Park's geothermal features (Sonderegger 1984; Kharaka et al. 1991; Kharaka et al.2002; LaFave 2016; MDEQ 2017).

Figure 4. Proposed Emigrant and Crevice withdrawal areas geology map. Geology map legend is displayed in Figure 5 on the following page.

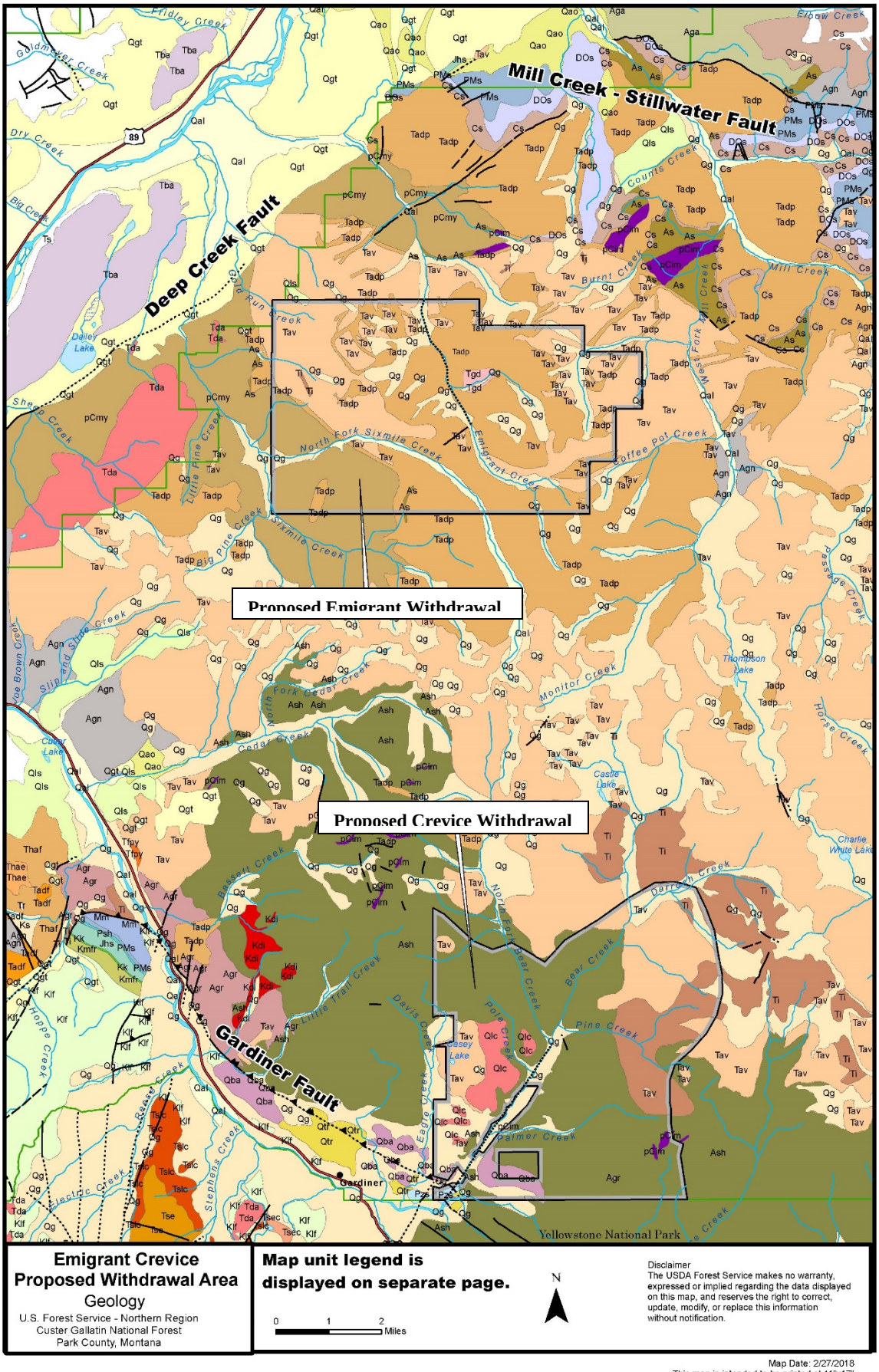


Figure 5. Geology map legend for map displayed in Figure 4 on the above page.

Crevice

The proposed Crevice withdrawal area is a historic mining district divided between two structurally separate geologic blocks: Mineral Hill (Jardine) and Crevice Mountain (Figure 4). The proposed Crevice withdrawal area includes an area referred to as the Jardine historic mining district which lies north of the Crevasse mining district. The Jardine mining district has also been referred to as the "Bear Gulch district" or "Sheepeater district".

The proposed Crevice withdrawal area mineralization is associated with lode deposits (disseminated ore) as well as native gold housed within veins of quartz which run through the adjacent rock mass (Van Gosen 1993). The area hosts the following minerals in order of decreasing abundance: gold, arsenic, tungsten, silver, copper, and lead (Wedow et al. 1975). Mineralization occurs primarily as either replacement veins (up to 4 ft. in width) or as remobilized concentrations within the banded iron formations (CMG 2016; Johnson et al. 1993). Much of the known mineralization occurs on patented claims. However, additional mineral anomalies on public lands have been identified from exploration work conducted in areas surrounding Crevice Mountain (Montana DEQ 2017; CMG 2016).

Placer gold was first discovered in 1862 and the discovery of gold-bearing quartz deposits followed shortly after that. The area was not actively developed until the 1880's due to its inclusion in the Crow Reservation. Since then, there have been 80 mining claims patented, numerous mine prospects explored (mostly lode deposits), and some mineral development in the Crevice-Jardine area. One of the limiting factors for mining development and processing in this area has been the lack of water (CMG 2016; Grosvenor 2017; Johnson et al. 1993).

Past locatable mineral activity in the proposed Crevice withdrawal area includes activities on private lands and NFS lands. The Mineral Hill mine (private) was operated by TVX from 1989 – 1996 (MDEQ 2017) and produced approximately 575 short tons per day at an average grade of 0.281 ounces per ton gold with some silver (Hammarstrom et al. 1993). In 1996, TVX was in the process of constructing a tunnel from Mineral Hill under Palmer Mountain to reach the Crevice Mountain mineralized zone when unexpected groundwater was encountered. This unexpected groundwater consequently shut down the operation by 1998. The Mineral Hill Mine was reclaimed by 2002, with the exception of an in-situ evaporative tailings facility (approx. 252,000 cubic yards) that remain on site and is operated by TVX Mineral Hill Inc./Kinross Gold Corp. In August 2017, TVX entered into an agreement with the Rocky Mountain Elk Foundation to set aside, in perpetuity, 549 acres of TVX's patented mining claims around the Mineral Hill Mine. The agreement placed the private lands into a conservation easement (Mineral Hill – Bear Creek) restricting them from future locatable mining operations.

In 2015, the Crevice Mining Group (CMG) began staking unpatented claims on NFS lands and securing private claims in the Crevice Mountain area. Since then CMG has submitted the following proposals:

1. A plan to Montana DEQ for exploration on 14 acres of private lands near the historic Snowshoe Mine (CMG 2016). In 2016, Montana DEQ issued CMG a deficiency letter in regards to their plan completeness. To date, Montana DEQ has not received the supplemental information needed to address identified deficiencies from the company. The processing of the exploration license is on hold pending CMG's response (Lane 2017). Based on communication with CMG's Mr. Werner (September 6, 2017), CMG is not currently pursuing this permit with Montana DEQ. Instead CMG is progressing under Montana DEQ's small miner exclusion program.

2. In 2017, CMG submitted to Montana DEQ their small miner exclusion statement indicating that no work had been done in 2016. CMG currently holds a small miners exclusion statement allowing them to conduct certain mining activities on private lands. This allows for mining operations up to five acres of total surface disturbance and includes mine reclamation requirements.

3. A road use permit was authorized in 2017 for CMG to use and maintain 2 miles of Forest Service road that access's private lands in association with mining activities on private lands.

CMG's proposed exploration program is intended to determine the continuity of potential ore bodies and delineate the economic ore reserves within their property boundary in the southeastern corner of the proposed Crevice withdrawal boundary (CMG 2016).

Mining Claims and Minerals Leases

As of November 2017, BLM records indicate there are approximately 53 unpatented mining lode claims and 6 mill site claims in the proposed Crevice withdrawal area. Currently, most of the claims in the proposed Crevice withdrawal area are held by Crevice Mining Group.

There are no proposed or current federal minerals leases within the proposed Crevice withdrawal area.

Evaluation of mineral potential

Locatable

The proposed Crevice withdrawal area has a high potential for locatable mineral occurrence and development. Numerous known locatable mineral deposits have been identified and developed since the late 1800's (Hammarstrom et al 1993; Hammarstrom et al 1998). Any undiscovered deposits would likely be similar to the deposit types that have been mined in this area in the past (i.e. lode gold deposit at the Mineral Hill mine). A previous USGS report estimated a 90 percent chance of one or more additional deposits similar to the mined Mineral Hill deposit in the Crevice-Jardine area, a 5 percent chance of two or more additional deposits, and a 1 percent chance of three or more deposits (Hammarstrom et al 1993). This report concluded that the median estimate for undiscovered deposits in this area is 860,000 metric tons of ore containing 8.1 metric tons of gold and negligible silver. If market conditions become favorable for other commodities, the irregular distribution of mineralized zones with lenticular masses of extremely variable size containing silver, copper, lead, zinc, tungsten, and even arsenic (Seager 1944) could also be further explored and developed in the Crevice area.

Coal, Oil and Gas

The proposed Crevice withdrawal area is not part of any defined Montana oil and gas province (Hammarstrom et al 1993). Sedimentary rocks in the Gardiner fault zone just beyond the south end of the proposed Crevice withdrawal area could host small coal, oil and gas deposits (Fraser et al 1969; Hammarstrom et al 1993) that are not large enough to warrant commercial exploration and production. The potential for the occurrence of coal, oil and gas resources in the portions of the ABSA that include the proposed Crevice withdrawal areas is low.

Geothermal

The potential for the occurrence of geothermal resources in the proposed Crevice withdrawal area is high, but only along the Gardiner fault zone, which forms the south boundary of the withdrawal area. In the proposed Crevice withdrawal area, a geothermal spring exists at the confluence of

Bear Creek with the Yellowstone River. Yellowstone National Park's Mammoth hot springs is approximately 8 km south of the Bear Creek spring. Conclusions from a USGS evaluation of the effects of potential geothermal resource development to Yellowstone National Park's thermal features include:, "Chemical and isotopic evidence is consistent with a minor component of Mammoth-type thermal water in Bear Creek Springs, indicating that there could be a hydraulic connection between these two areas. The major part of the thermal-water discharge in the Bear Creek area, however, appears to come from sources other than the Mammoth hydrothermal system." and "Geothermal development in the Bear Creek area that induced substantial reservoir drawdown could also affect Mammoth Hot Springs…..However, the degree of hydraulic connection between such areas and thermal features in the Park is unknown." (Kharaka et al 1991). The USGS evaluation discusses potential recharge of some groundwater into the Bear Creek spring from within the Crevice withdrawal area as groundwater flows into the Gardner fault and Yellowstone River valley.

Any future geothermal development activities in the Crevice area would be required to comply with the State of Montana's Yellowstone Controlled Groundwater Area rules. The stated purpose of these rules is to ensure preservation of geothermal resources in Yellowstone National Park.

3.2 Scenic Resources

Scenic resources constitute all scenery visible to people. Scenery is described as the general appearance of a place or landscape, or the features of a landscape. The visual condition varies by location and is dependent on natural features such as geology, vegetation, landforms, and human developments.

Forest Plan Goal

Provide Forest visitors with visually appealing scenery.

Analysis Measures

Scenic Integrity

Scenic integrity is a measure of the intactness of the scenic character. This indicator takes into account any impacts that appear unnatural or uncharacteristic in form, line, color, texture, and scale. This indicator uses a descriptive or qualitative scale from preservation, which is entirely intact; to maximum modification which is heavily impacted and dominated by an unnatural or uncharacteristic feature on the landscape.

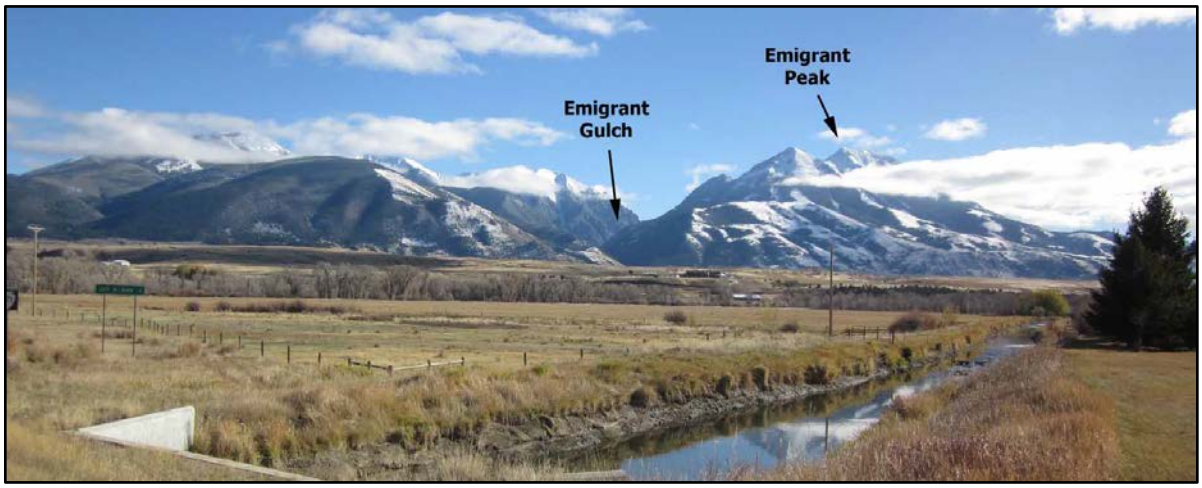
Visual Quality Objectives

The Forest Plan includes requirements for consideration, treatment, and protection of resources such as scenery and aesthetics, and assigns a Visual Quality Objectives (VQO) for designed MAs. The Forest wide standard "requires environmental analysis and project designs for landscape altering activities to be evaluated to determine if they are compatible with the assigned VQOs. Landscape altering projects shall meet the assigned VQOs." (Forest Plan pg. II-17). The Forest Plan uses the scenery management system described in Agriculture Handbook 701, Landscape Aesthetics, A Handbook for Scenery Management (USDA 1995). The scenery management system is structured to emphasize natural appearing scenery and broadly recognizes scenery as the visible expression of dynamic ecosystems functioning within "places" that have unique aesthetic and social values.

Emigrant

The proposed Emigrant withdrawal area contains Emigrant Peak (10,915 ft.) located east of Highway 89. Emigrant Peak is visible from much of the Paradise valley, with its summit covered in snow most of the year. According to National Park Service data (2016), 1.4 million vehicles annually traveled the portion of Highway 89 that enters into the north side of Yellowstone National Park and passed within views of the proposed Emigrant withdrawal area. Approximately 29 miles of Highway 89 is visible from within the proposed Emigrant withdrawal area.

Picture 1. View of the proposed Emigrant withdrawal area at mile marker 28 along Highway 89.



Scenic Integrity

Past exploration and development of minerals within the proposed Emigrant withdrawal area has occurred. Signs of these activities are still visible from within the proposed withdrawal area including exploratory prospect pits, abandoned mining sites, old buildings, and switchback roads.

Visual Quality of Objectives

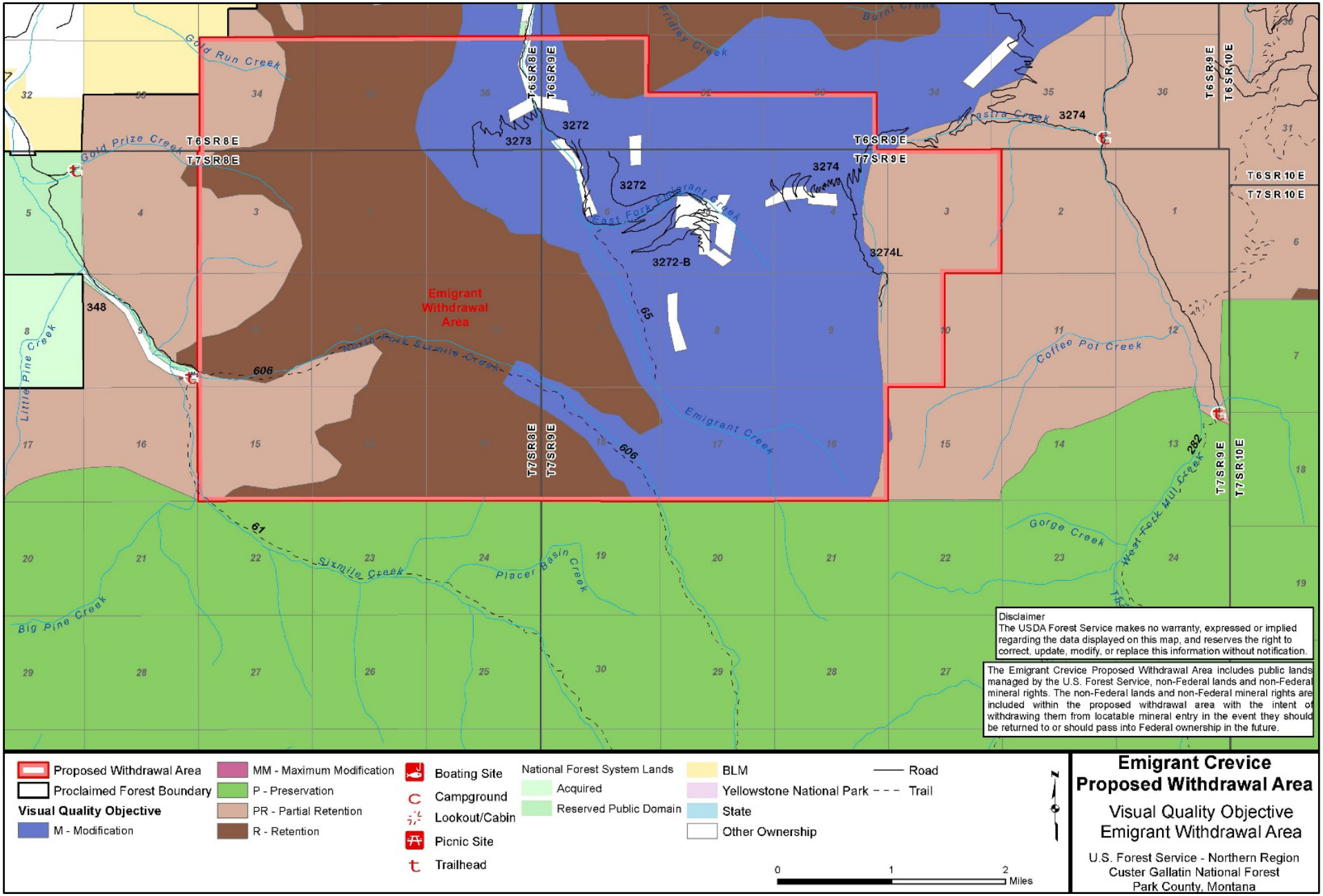
The proposed Emigrant withdrawal area contains VQOs for three classifications: Modification, Partial Retention, and Retention (Figure 6). Table 3 provides the percent of total project acres within each VQO and descriptions of the relevant VQO classes in the proposed Emigrant and Crevice withdrawal areas.

Table 3. VQO class, percent of proposed Emigrant and Crevice withdrawal areas, and description of VQOs found within proposed area.

VQO class	**Descriptions VQOs** (Agriculture Handbook 701)
Modification Emigrant: 42% Crevice: 45%	- Under the modification visual quality objective management activities may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional parts of these activities such as structures, roads, slash, root wads, etc., must remain visually subordinate to the proposed composition. - Activities which are predominately introduction of facilities such as buildings, signs, roads, etc., should borrow naturally established form, line, color and texture so completely and at such scale that its visual characteristics are compatible with the natural surroundings.

VQO class	**Descriptions VQOs** (Agriculture Handbook 701)
Partial Retention Emigrant: 20% Crevice: 55%	- Management activities remain visually subordinate to the characteristic landscape when managed according to the partial retention visual quality objective. - Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape. Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.
Retention Emigrant: 38% Crevice: 0%	- This visual quality objective provides for management activities which are not visually evident. - Under Retention activities may only repeat form, line, color, and texture which are frequently found in in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident.

Figure 6. Map displaying VOQ classification for the proposed Emigrant withdrawal area (facing north).



Crevice

The proposed Crevice withdrawal area is located adjacent to the northern boundary of Yellowstone National Park and portions are visible from within the Park along the Mammoth to Roosevelt Road (Highway 89). The Mammoth to Roosevelt Road has an average daily traffic count of 4,350 vehicles per day (National Park Service 2016). Park visitors along this roadway have direct views of the proposed Crevice withdrawal area for 1.5 miles. The proposed Crevice withdrawal area is also visible from Blacktail Plateau and Blacktail ponds. Visitors at Blacktail Plateau and Blacktail ponds, looking north, can view portions of the proposed Crevice withdrawal area. These areas are popular tourist areas for wildlife viewing for bison, elk, and grizzly bears. Private land is also visible from both the Mammoth to Roosevelt Road and the Blacktail Plateau/Ponds areas.

Picture 2. View from the proposed Crevice withdrawal area (Crevice Mountain) looking south towards Blacktail Plateau in Yellowstone National Park. Yellowstone's northern boundary is located a few hundred yards downhill from this location.

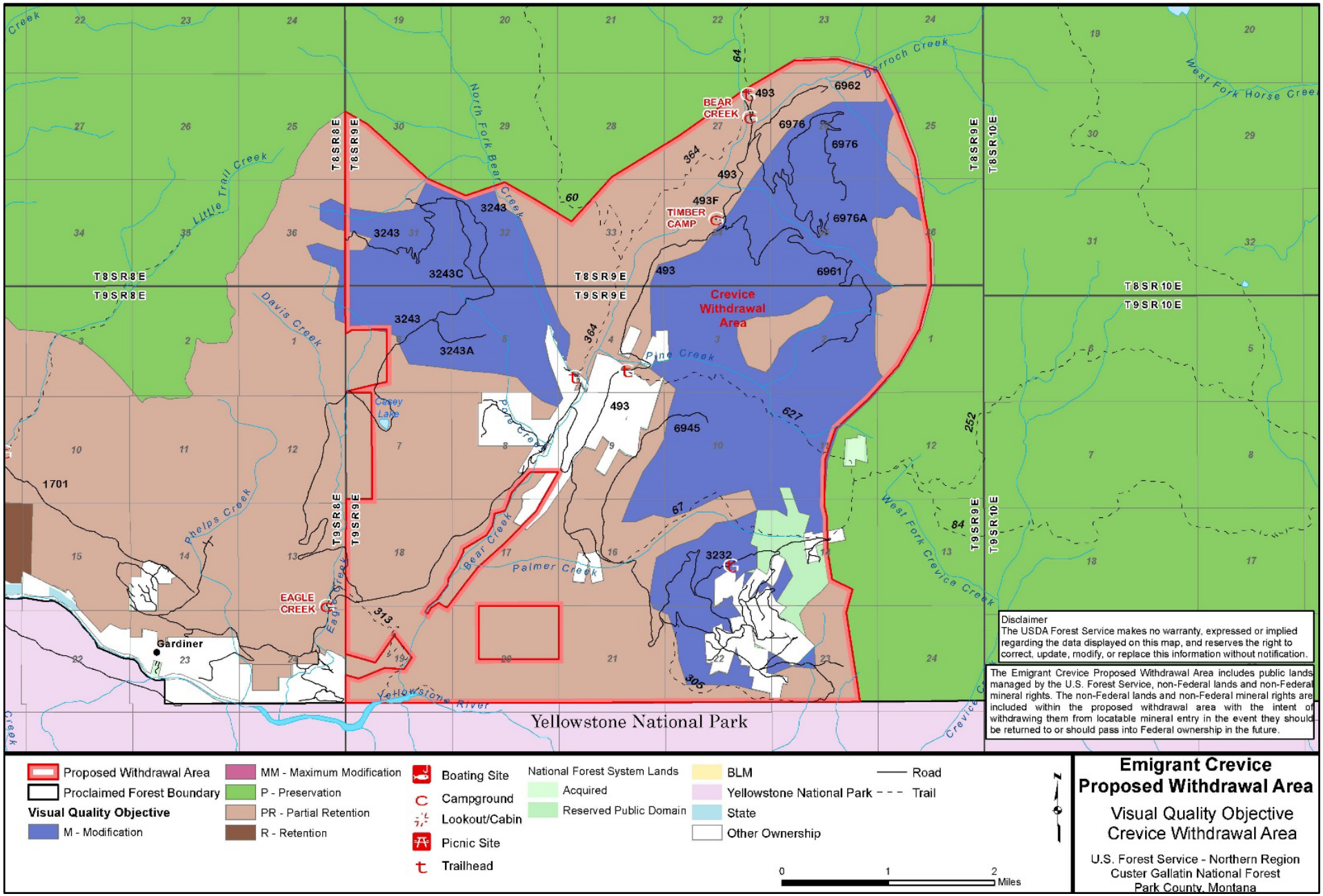
Scenic Integrity

Past exploration and development of minerals within the proposed Crevice withdrawal area has occurred. Signs of these activities are still visible from within the proposed withdrawal areas including exploratory prospect pits, abandoned mining sites, old buildings, and switchback roads.

Visual Quality of Objectives

The proposed Crevice withdrawal area contains VQOs for two classifications: Modification and Partial Retention (Figure 7). Table 3 provides the percent of total project acres within each VQO and descriptions of the relevant VQO classes in the proposed Emigrant and Crevice withdrawal areas.

Figure 7. Map displaying VOQ classification for the proposed Emigrant withdrawal area (facing north).



3.3 Recreation Resources

Forest Plan Goal

Provide for a broad spectrum of recreation opportunities in a variety of Forest settings.

The area's wildlands connect and complement vast expanses of rural settings and growing communities. Majestic scenery, clean water, and unique wildlife that attracted the areas first inhabitants continue to draw people seeking a high quality of life today. High value, low impact visitation through geo-tourism, and trail-based recreation, serve to link communities with wildlands. During any season, visitors and residents can enjoy world-class outdoor recreation opportunities within both the proposed Emigrant and Crevice withdrawal areas.

Analysis Measures

Recreation Opportunity Spectrum

The Recreation Opportunity Spectrum (ROS) offers a framework for understanding relationships and interactions, having to do with people and recreation options. The Forest Plan classifies areas with specific ROSs. To maintain consistency with the Forest Plan, ROS classifications should not be adjusted.

Roadless Rule

The 2001 Roadless Rule establishes prohibitions on road construction, road reconstruction, and timber harvesting on 58.5 million acres of inventoried roadless areas (IRA) on NFS lands. The intent of the 2001 Roadless Rule is to provide lasting protection for inventoried roadless areas within the NFS in the context of multiple-use management. Both the proposed Emigrant and Crevice areas contain lands that are designated as roadless areas by the 2001 Roadless Rule. Reasonable access for the exploration of locatable minerals, or development of valid claims pursuant to the General Mining Law of 1872 is not prohibited by this rule. Determination of access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

Wilderness Act

The Wilderness Act of 1964 (Public Law 88-577), Public Law 95-249, and the Wyoming Wilderness Act (Public Law 98-550) comprise the guiding legislation for the Absaroka – Beartooth Wilderness, with a total of 937,032 (wilderness.net) acres in Montana and Wyoming on the Custer Gallatin and Shoshone National Forests. Neither area proposed for this mineral withdrawal are within Wilderness.

Research Natural Areas

A Research Natural area (RNA) is a federally protected area defined as any tract of land or water which supports high quality examples of terrestrial or aquatic ecosystems, habitats, and populations of rare or endangered plant or animal species, or unique geological study of the features, and is managed in a way that allows natural processes to predominate. Designation of an RNA is an internal agency process guided by the FSM 4063.02, NEPA regulations, and Forest Plan documents. The Sliding Mountain RNA is adjacent to the proposed Emigrant withdrawal area. No acres within the proposed withdrawal areas overlap with any designated RNA.

Emigrant

The Forest Plan MA descriptions for the proposed Emigrant withdrawal area indicate relatively undeveloped, dispersed recreation. Recreation, livestock forage, grizzly bear, and big game

habitat are key management goals within the proposed withdrawal area, and hunting is an important activity in this terrain.

Dispersed camping is a popular activity for overnight users who prefer not to camp in a developed campground. There are two inventoried dispersed campsites in the proposed Emigrant withdrawal area, but dispersed camping is not limited to designated locations. Dispersed sites are generally found adjacent to roads or trails, and no amenities are provided such as a fire ring, picnic table, or toilet facilities. These campsites generally receive low to moderate use beginning in late spring after the snow melts with the majority of sites receiving more use during summer months and the fall hunting season. The identified campsites receive regular use and have campfire scars and rock rings.

The majority of recreation use in Emigrant Gulch generally is day use. Typical visitation occurs during the summer and fall hunting season and decreases in November. In the summer visitors drive ATVs and full sized high clearance vehicles on the roads, or travel by foot or horse along the North and South Six Mile trails either as a day trip or to access the Absaroka-Beartooth Wilderness for extended backcountry trips. Access on mining roads to Arrastra Lake and the surrounding area is a popular day trip, beginning in the West Fork of Mill Creek drainage and entering the project area on roads 3274 and 3274L. In the winter backcountry skiers tour up toward Emigrant Peak. Snowmobilers can travel in the east half of the withdrawal area.

North and South Six Mile trails offer access to approximately 7 miles of trail that lie within the withdrawal boundary. These trail network extends well beyond the six miles of trail within the proposed Emigrant withdrawal area and enter the Absaroka-Beartooth Wilderness. There are three trailheads immediately adjacent to the proposed withdrawal area that access trails entering the west side of the Absaroka – Beartooth Wilderness: Sixmile, North Fork Sixmile, and Gold Prize. Gold Prize Creek trailhead is a common route for those who climb Emigrant Peak. Approximately 13 miles of motorized trails and roads access a variety of terrain in Emigrant Gulch and the surrounding area. All routes within the proposed Emigrant withdrawal area are designated as roads, motorized, or Class 2 trails. Table 4 describes the trails and roads within the proposed Emigrant withdrawal area. There are no developed recreation sites within the proposed Emigrant withdrawal area.

Table 4. Roads and trails, season of use, designed use, and trail class found within the proposed Emigrant withdrawal area.

Trail/Road Name and Number	Season of Use	Designed Use	Trail Class
606 North Six Mile Trail	Year round	Foot/stock/bicycles	Trail Class 2
61 South Six Mile Trail	Year round	Foot/stock	Trail Class 2
3272 Emigrant Creek Road*	6/16 – 12/1	Highway legal motorized vehicles	Motorized
3273 Emigrant Peak Road*	6/16 – 12/1	Highway legal motorized vehicles	Motorized
3272-B East Fork Emigrant Creek*	6/16 – 12/1	Highway legal motorized vehicles	Motorized
65 Emigrant Creek	Year round	Foot/stock/bicycles	Trail Class 2
3274 Arrastra Creek**	6/16 – 12/1	Motorized vehicles <50” wide	Motorized
3274-L Arrastra Lake Road**	6/16 – 12/1	Motorized vehicles <50” wide	Motorized

**Roads open to highway legal vehicles only, with seasonal designation.*
***Trails and gated roads open to wheeled (non-tracked) vehicles 50 inches or less in width, with seasonal designation.*

There are currently five long term recreation special use permits that operate within the proposed Emigrant withdrawal area. Permitted use occurs year round, with spring bear hunting, summer horseback rides after snowmelt, fall hunting, and winter dogsledding. Emigrant Gulch is the occasional site of commercial filming, with one permit issued June 2016. Table 5 provides information about the five long term recreation special use permits.

Table 5. Summary of the five longer term special use recreation permitted that may be effected by the proposed Emigrant withdrawal (not including ad hoc filming permits).

Permit Company Name	Type of Use & Season of Use	Authorized Client Days[3] within Emigrant area
Bear Paw Outfitters	Spring bear, day use horseback rides, day use hunting	600
Chico Hot Springs	Horseback rides	150
Dome Mountain Ranch	Day use hunting	450
Flying Diamond Guide Service	Spring bear, day use horseback rides, day use hunting	270
Rising Son Outfitters	Day use spring bear, day use horseback rides	120

The proposed Emigrant withdrawal area lies within big game management units for deer (Southern Mountains unit), elk (Absaroka and Northern Yellowstone units), gray wolf (unit 390), and mountain lion (units 313, 316, and 317). The area is popular during bow and rifle seasons in late summer and fall, with three permitted outfitters offering spring bear hunts.

Recreation Opportunity Spectrum

The proposed Emigrant withdrawal area contains four ROS classes: Rural, Roaded Natural, Semi Primitive Motorized, and Semi Primitive Non-Motorized (Forest Plan, p. VI-34). The ROS classes can differ between the summer and winter seasons. Some areas are open to motorized use (over snow vehicles) in winter, while closed to vehicles with motors during the summer. Table 6 provides the percent of total project acres within each mapped summer or winter ROS class's, with the corresponding settings, activities, and opportunities. Maps displaying ROS classes for the proposed Emigrant withdrawal area can be found within the project record.

Table 6. Recreation Opportunity Spectrum (ROS) class and settings, activities, and opportunities for the proposed Emigrant and Crevice withdrawal areas.

ROS Class	Settings, activities, and opportunities
Primitive Emigrant 0% Crevice Summer: less than 1% Winter: less than 1%	- Timber harvest may be scheduled - VQO of 'retention' as seen from roads and trails are met - Access is generally by single or double lane dirt/gravel roads - Road management objectives are to accept or encourage use by dispersed recreationist in highway vehicles - Use densities in people at one time per acre range between 0.04 and 0.25. Density includes averaging in developed sites - Provide visitors with an opportunity to meet and enjoy other visitors and be isolated from sights and sounds of other people. - Visitors have the opportunity to interact with the natural environment, but the risk and challenge associated with the semi-primitive motorized is not present.

[3] One client day equals one person.

ROS Class	Settings, activities, and opportunities
	- Describes large, remote, wild, and predominately unmodified landscapes. Areas with no motorized activity and little probability of seeing other people. Includes most wilderness areas.
Rural Emigrant Summer: 5% Winter: 5% Crevice Summer: 25% Winter: 25%	- In the Rural class settings, the sights and sounds of human activity are readily evident, though less pronounced and less concentrated than in the Urban class. - Levels of use vary, but do not reach those concentrations of the Urban class except at specialized and developed sites. While the characteristic landscape is often dominated by human-caused geometric patterns, there is also a dominant sense of open, green-space. - Highly developed recreation sites and modified natural settings. Easily accessed by major highway. Located within populated areas where private land and other land holdings are nearby and obvious. Facilities are designed for user comfort and convenience.
Roaded Natural Emigrant Summer: 5% Winter: 0% Crevice Summer: 50% Winter: 0%	- Predominately natural-appearing settings, with moderate sights and sounds of human activities and structures. The overall perception is one of naturalness. - Evidence of human activity varies from area to area and includes improved highways, railroads, developed campgrounds, small resorts and ski areas, livestock grazing, timber harvesting operations, watershed restoration activities, and water diversion structures. - Roads and motorized equipment and vehicles are common in this setting. - Density of use is moderate except at specific developed sites, and regulations on user behaviors are generally less evident than in the Urban or Rural classes. - Often referred to as front country recreation areas. Accessed by open system roads that can accommodate sedan travel. Facilities are less rustic and more developed (campgrounds, trailheads, etc.). Often provide access points for adjacent Semi-Primitive Motorized, Semi-Primitive Non-motorized, and Primitive settings.
Semi Primitive Non Motorized Emigrant Summer: 60% Winter: 60% Crevice Summer: 10% Winter: 20%	- The Semi-Primitive Non-Motorized class is characterized by predominately natural or natural-appearing landscapes. The size of the area gives a strong feeling of remoteness from the more heavily used and developed areas. Within this setting, there are ample opportunities to practice wildland skills and to achieve feelings of self-reliance. - The difference between the semi-primitive motorized and non-motorized settings is the presence or absence of motorized vehicles. - In the non-motorized settings, the presence of roads is tolerated, provided they are closed to public use, they are used infrequently for resource protection and management, and the road standards and locations are visually appropriate for the physical setting. In many cases, old roads are acceptable as non-motorized travel ways so long as they do not reflect misuse or poor stewardship of the land. - Areas of the Forests managed for non-motorized use. Uses include hiking and equestrian trails, mountain bikes and other non-motor mechanized equipment. Rustic facilities and opportunity for exploration, challenge, and self-reliance.
Semi Primitive Motorized Emigrant Summer: 30% Winter: 35% Crevice Summer: 15% Winter: 55%	- The Semi-Primitive Motorized class is characterized by predominately natural or natural-appearing landscapes. The size of this area gives a strong feeling of remoteness from the more heavily used and developed areas. Within this setting, there are ample opportunities to practice wildland skills and to achieve feelings of self-reliance. - The most significant difference between the semi-primitive motorized and non-motorized settings is the presence or absence of motorized vehicles. - In many cases, old roads are acceptable as non-motorized travel ways so long as they do not reflect misuse or poor stewardship of the land. These roads would have motorized use in the semi-primitive motorized class, especially by ORVs. - Backcountry areas used primarily by motorized users on designated routes. Roads and trails designed for OHVs and high-clearance vehicles. Offers motorized opportunities for exploration, challenge, and self-reliance. Rustic facilities. Often provide portals into adjacent Primitive or Semi-Primitive Non-Motorized areas.

Wilderness, Research Natural Areas, and Inventoried Roadless Areas

The proposed Emigrant withdrawal area does not include any designated Wilderness or RNAs,

but does include potations of two IRAs4. Six hundred and fourteen acres are within the Chico Peak IRA and 7,407 acres are within the North Absaroka IRA.

Crevice

The Forest Plan MA descriptions for the proposed Crevice withdrawal area indicate wildlife and recreational activities may be managed to reduce conflicts between people and wildlife. Grizzly bear and big game habitat are important components, as well as associated big game hunting activities. Recreational activities are pursued in this diverse terrain both winter and summer, with people generally coexisting among the resident wildlife species. There is one administrative site, Penstock, within the proposed Crevice withdrawal area.

Dispersed camping is a popular activity for overnight users who prefer not to camp in a developed campground. There are 80 inventoried dispersed campsites within the proposed Crevice withdrawal area, but dispersed camping is not limited to designated locations. Dispersed sites are generally found adjacent to roads or trails, and no amenities are provided such as a fire ring, picnic table, or toilet facilities. These campsites receive low to moderate use beginning in late spring with the majority of sites showing heaviest use during summer months and the fall hunting season. Many of these campsites have been used for decades with some sites showing soil compaction and a loss of vegetation.

There are two developed recreation sites within the proposed Crevice withdrawal area, Bear Creek and Timber Camp campgrounds. These two campgrounds are dispersed camping areas in a remote setting with basic amenities (fire rings and picnic tables) but no water or host on site. These campgrounds are consistent with the nationally recognized niche of Forest Service campgrounds being on the rustic end of the spectrum. Use levels vary from site to site. Generally there is lower usage in the spring and early summer, moderate to high use during the summer, and moderate to high in peak holiday weekends. The largest amount of visitor use occurs during the summer and fall. The proposed Crevice area is a popular area during hunting season. Visitation tends to decrease in November, especially for overnight use, due to colder weather and the ending of hunting seasons.

Eagle Creek campground is immediately adjacent to the proposed withdrawal area. This campground is close to the town of Gardiner and Yellowstone National Park and often fills to capacity during peak visitor months. The campground is adjacent to a trailhead and corrals and offers 15 campsites, two group camp sites (30-40 people per group), 10 campsites with stalls for stock, and 10 trailhead parking spots.

There are five trailheads within the proposed Crevice withdrawal area and one trailhead immediately adjacent. They offer access to over 15 miles of trail that lies within the withdrawal boundary. The larger trail network extends well beyond these 15 miles and enters Yellowstone National Park and the Absaroka-Beartooth Wilderness. Approximately 36 miles of motorized trails and roads access a variety of terrain in Emigrant Gulch and the surrounding area. All trails within the proposed Crevice withdrawal area are designated as roads, motorized or Class 3 and 4 trails. Table 7 describes the trails and roads within the proposed Crevice withdrawal area. Table 7 does not include the numerous user created trails within the proposed withdrawal area.

[4] Reasonable access for the exploration of locatable minerals, or development of valid claims pursuant to the General Mining Law of 1872 is not prohibited by this rule. Determination of access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

Table 7. Roads and trails, season of use, designed use, and trail class found within the proposed Emigrant withdrawal area.

Trail Name and Number	Season of Use	Designed Use	Trail Class
60 North Fork Bear Creek	Year round	Pack & Saddle	Trail Class 3
64 Knox Lake	Year round	Pack & Saddle	Trail Class 3 & 4
67 Palmer Creek	Year round	Pack & Saddle	Trail Class 4
305 Crevice Creek	Year round	Pack & Saddle	Trail Class 3
313 Yellowstone River	Year round	Hiker/Pedestrian	Trail Class 4
364 Main Bear Creek	Year round	Pack & Saddle	Trail Class 3
627 Pine Creek	Year round	Pack & Saddle	Trail Class 3
Trail #231	Year round	Foot, stock, bicycles	
493 Bear Creek Road*	Year round 6/01 – 12/31	Highway legal motorized vehicles	Motorized
493F Bear Creek Road*	6/01 – 12/31	Highway legal motorized vehicles	Motorized
3232 Palmer Creek Road*	5/16 – 12/31	Highway legal motorized vehicles	Motorized
3243 Eagle Creek Road*	5/16 – 12/31 6/16 – 10/14	Highway legal motorized vehicles	Motorized
3243-A Pole Creek Road*	6/16 – 10/14	Highway legal motorized vehicles	Motorized
3243-C Middle Eagle Creek Road*	6/16 – 10/14	Highway legal motorized vehicles	Motorized
6945 Bald Mountain Road*	12/2 – 10/14	Highway legal motorized vehicles	Motorized
6961 Bear Fork Road*	12/2 – 10/14	Highway legal motorized vehicles	Motorized
6962 Darroch Creek Road*	6/01 – 12/31	Highway legal motorized vehicles	Motorized
6976 Ash Mountain Road*	6/01 – 12.31	Highway legal motorized vehicles	Motorized
6976-A Ash Mountain A Road*	6/01 – 12/31	Highway legal motorized vehicles	Motorized

**Roads open to highway legal vehicles only, with seasonal designation.*

There are three long term recreation special use permits that operate within the proposed Crevice withdrawal area. Use occurs year-round with fall hunting, winter skiing, summer fishing, backpacking, and hiking. In addition to the long term outfitting permits, there are two annual recreation events, a running race (Big Bear Stampede) and a ski race (Jardine Ski Run). Table 8 provides information about the three long term and two yearly recreation special use permits.

Table 8. Summary of the five longer term special use recreation permitted that may be effected by the proposed Emigrant withdrawal (not including ad hoc filming permits).

Permit Company Name	Type of Use & Season of Use	Authorized Client Days within Crevice area
Hells a Roarin' Outfitters	Summer overnight, overnight hunting, day use spring bear, horseback rides, fishing, sleigh rides, day use hunting, day use bison hunting, game retrieval	200
Specimen Creek Outfitters	Summer overnight, overnight hunting, horseback rides, day use hunting, game retrieval, day use bison hunting	50
Yellowstone Forever	Progressive backpacking, hiking, skiing	25
Big Bear Stampede	Annual running race	150 participants
Jardine Ski Run	Annual ski race	75 participants

The proposed Crevice withdrawal area lies within big game management units for deer (Southern Mountains unit), elk (Northern Yellowstone unit), gray wolf (unit 313), and mountain lion (units 313 and 316). The area is popular during bow and rifle seasons in late summer and fall, with one permitted outfitter offering spring bear hunts and one providing guide services for bison hunting. Both of these outfitters are also permitted for game retrieval.

Recreation Opportunity Spectrum

The proposed Crevice withdrawal area contains five ROS classes: Primitive, Rural, Roaded Natural, Semi Primitive Motorized, and Semi Primitive Non-Motorized (Forest Plan, p. VI-34). The ROS classes can differ between the summer and winter seasons. Some areas are open to motorized use (over snow vehicles) in winter, while closed to vehicles with motors during the summer. Table 6 provides the percent of total project acres within each mapped summer or winter ROS class's, with the corresponding settings, activities, and opportunities. Maps displaying ROS classes for the proposed Crevice withdrawal area can be found within the project record.

Wilderness, Research Natural Areas, and Inventoried Roadless Areas

The proposed Crevice withdrawal area does not include any designated Wilderness or RNAs. Six thousand, two hundred, and twelve acres are within the North Absaroka IRA5.

3.4 Terrestrial (Wildlife) Species

Forest Plan Goal

Provide sufficient habitat for recovery populations of threatened and endangered species (i.e. grizzly bear, bald eagle, and peregrine falcon.

Wildlife is plentiful and diverse in both withdrawal areas. Bighorn sheep, mountain goats, elk, mule deer, moose, grizzly bears, black bears, mountain lions, and wolves can be found within the project areas. The proposed Crevice withdrawal area encompasses the Gardiner Basin. The Gardiner Basin is the lowest portion of the Northern Yellowstone Winter Range, an area with a comparatively mild climate in the Greater Yellowstone Area landscape. The Northern Range is the wintering ground for Yellowstone National Park's largest

[5] Reasonable access for the exploration of locatable minerals, or development of valid claims pursuant to the General Mining Law of 1872 is not prohibited by this rule. Determination of access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

elk herd and consists of low to mid-elevation areas in the Lamar, Yellowstone, and Gardner river drainages inside and outside Yellowstone. The project area is important for elk migration to Dome Mountain.

Analysis Measures

The indicators for effects are the type and number of species affected and/or the direction of changes in acres of habitat impacted. Species are grouped into categories based on their status: species federally listed with the Endangered Species Act, species considered sensitive by the Forest Service, Forest Plan identified management indicator species, migratory birds identified in the Migratory Bird Treaty Act, Bald, and Golden Eagle Protection Acts.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) directs all Federal agencies to use their existing authority to conserve threatened and endangered species and, in consultation with the United States Fish and Wildlife Services (USFWS) or National Marine Fisheries Service (NMFS), to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of federal lands as well as federal actions that may affect listed species.

Federally Listed Canada Lynx and its Critical Habitat

On February 24, 2000, the USFWS listed the Canada Lynx as Threatened under the ESA and critical habitat was designated. The Forest Service must therefore ensure that any action it authorizes is not likely to jeopardize the continued existence of this species, or to destroy or adversely modify critical habitat. There are many documents that have been developed cooperatively for managing Canada Lynx and its habitat including:

- The Northern Rockies Lynx Management Direction (NRLMD) Record of Decision (ROD) was published in March 2007 (USDA FS 2007). This decision amended the Forest Plan by incorporating goals, objectives, standards and guidelines for lynx habitat management. On March 27, 2017, the USFWS issued an amended Incidental Take Statement for the 2007 biological opinion on the effects to Canada lynx from the NRLMD.

- The Lynx Conservation Assessment and Strategy (Interagency Lynx Biology Team 2013) and NRLMD ROD discuss the use of a lynx analysis unit (LAU) to analyze project impacts to Canada lynx. LAUs approximate the area used by an individual lynx and are the units used to analyze the effects of a project. The NRLMD ROD identified the LAU as the appropriate scale for analysis and consultation (USDA FS 2007).

    - The proposed Crevice withdrawal lies wholly within the Gardiner/Tom Miner LAU.
    - The proposed Emigrant withdrawal area lies wholly within the Emigrant LAU.

- The Final Rule designating critical habitat for lynx (USDI Fish and Wildlife 2009) identifies Primary Constituent Elements (PCEs), as those physical and biological features that are essential to the conservation of the species, and that may require special management considerations. In 2014 critical habitat was revised (USDI Fish and Wildlife 2014).

    - Both withdrawal areas are wholly or partially within Unit 5, Greater Yellowstone Area, and are designated critical habitat.

Proposed Federally Listed Wolverine

The North American wolverine was proposed to be listed as a threatened species under the ESA

by the USFWS in February 2013. The USFWS withdrew a proposed rule to list the species in 2014. A lawsuit ensued and the District Court Judge ordered the USFWS to reconsider whether to list the wolverine as a threatened species. On October 18, 2016 USFWS proposed wolverines to be listed again (50 Fed. Reg. 2016:71670).

Species proposed for listing on NFS lands are managed under the authority of the Federal ESA (PL 93-205, as amended) and the National Forest Management Act (PL 94-588). Under provisions of the ESA, Federal agencies shall use their authorities to carry out programs for the conservation of listed species, and shall ensure that any action authorized, funded, or implemented by the agency is not likely to jeopardize the continued existence of proposed species (16 USC 1536). The North American wolverine is also considered a Forest Service sensitive species.

Forest Service Sensitive Species

Sensitive species are defined as "those plant and animal species identified by a Regional Forester for which population viability is a concern". It is the policy of the Forest Service regarding sensitive species to as part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species (FSM 2670.32). Forest Service sensitive species known to occur or have potential to occur within the proposed Emigrant and/or Crevice withdrawal areas are displayed in Table 10 below. Grizzly bear and gray wolf are discussed briefly below as they have been de-listed in recent years.

Grizzly Bear

The grizzly bear was listed as a threatened species under the ESA 1973, as amended (16 U.S.C. 1531), in the lower 48 states in 1975 (40 Federal Register 1975:31736). The Grizzly Bear Recovery Plan (USDI Fish and Wildlife Service 1982, revised 1993) delineated grizzly bear recovery zones in six mountainous ecosystems in the United States, including the Greater Yellowstone Ecosystem. Grizzly bears that occur in the proposed withdrawal areas are part of the Greater Yellowstone Ecosystem population.

The U.S. Secretary of the Interior announced on June 22, 2017 that the federal protections could be removed and overall management can be returned to the states and tribes. A Final Rule removing the Greater Yellowstone Ecosystem grizzly bear population was published June 30, 2017. The 2016 Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Ecosystem is the guiding document for management and monitoring of the Greater Yellowstone Ecosystem grizzly bear population and its habitat upon recovery and delisting.

Gray Wolf

Gray wolves were once listed as a threatened species under the ESA. They were reintroduced into the Greater Yellowstone Ecosystem in 1995 and 1996 and now occupy habitat across much of the Gallatin portion of the Custer Gallatin National Forest. Gray wolves were removed from the Threatened and Endangered Species list in 2011, and in Montana, they are currently managed as a game species.

Forest Plan Management Indicator Species

Forest Service Manual 2620.5 defines Management Indicator Species (MIS) as "plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management

activities on their populations and the populations of other species with similar habitat needs which they may represent" (FSM 2620). Identified wildlife MIS for Custer Gallatin NF are: bald eagle, grizzly bear, elk, goshawk, and marten. Regulations at 36 CFR 219.19(a)(1) require that certain vertebrate and/or invertebrate species present in the area be identified as MIS within the planning area (Custer Gallatin NF) and that these species be monitored, as "their population changes are believed to indicate the effects of management activities". Monitoring of MIS and determinations of population change occurs at the forest planning level. Table 9 is a summary of current trends for MIS found within the Custer Gallatin NF.

Table 9. Summary findings of MIS as reported in Canfield 2016.

Species	Monitoring Report Conclusions
Bald Eagle *(Haliaeetus leucocephalus)*	Populations of bald eagles have increased state-wide and on the Gallatin National Forest. The effects of management activities on the Gallatin National Forest have been effectively mitigated through nest management plans that limit vegetation alteration and human disturbances.
Grizzly Bear *(Ursus arctos horriblis)*	Management activities on the Gallatin National Forest have increased secure habitat for grizzly bears, which may be contributing to the increasing occupation and populations of grizzly bears on the Gallatin National Forest outside of the recovery zone.
Elk *(Cervus elaphus)*	Elk populations are managed by Montana Fish, Wildlife and Parks to include a harvestable surplus, but to be sensitive to the tolerances of private landowners as well. MTFWP adjustments to harvest quotas are made to try and stay within an agreed upon population level for each Elk Management Unit. These populations are influenced by multiple variables, but generally not by a lack of habitat. Habitat on the Gallatin National Forest includes many areas with high security (low road density), and abundant hiding cover. High quality foraging habitat appears to be very limited and management actions that create such habitat (prescribed burning, timber harvest), designed collaboratively with MTFWP could benefit elk and perhaps result in more elk available on public lands for wildlife viewing and hunting. The western portion of the proposed Crevice withdrawal is an important winter range.
Goshawk *(Accipiter gentilis)*	Globally, northern goshawks are well distributed and stable at the broadest scale. Based on broad-scale habitat and inventory and monitoring assessments conducted in Region 1 since 2005, breeding goshawks and associated habitats appear widely distributed and relatively abundant on National Forest lands. Based on a detection surveys, goshawks are present and well distributed across the Gallatin National Forest, with more goshawks nesting on the Yellowstone Ranger District compared to other ranger districts. Goshawk populations appear to be stable. Compared to natural events that have or could affect goshawk habitat, project level management activities on the Gallatin National Forest are relatively inconsequential. Project level surveys ensure that goshawk nests, if found, are protected by mitigation measures as outlined in the northern goshawk Northern Region Overview. No known post fledgling areas are identified in either of the withdrawal areas.
Marten *(Martes Americana)*	Although this species was selected as a MIS and is being monitored accordingly, there are many other factors influencing populations besides habitat change. Because it is a harvested furbearer, fur market prices, accessibility to populations by humans, and other factors related to trapping may be the most important population level determinants. Timber harvest has had a minor influence on pine marten habitat availability on the Gallatin National Forest. The travel plan decision may have had an indirect effect to reduce effective trapping pressure by reducing motorized access in some areas.

Migratory Birds, EO 13186 of January 10, 2001

EO 13186 (January 10, 2001) requires federal agencies to consider management impacts to migratory birds to further the purposes of the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and other laws. Federal agencies need to identify whether unintentional take will occur, and if so, whether such take would have a measurable negative effect on migratory bird populations. Take is defined to mean "… to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue" (50 CFR 10.12).

Special Interest Species

Bison

The proposed Crevice withdrawal area is part of the Crevice Eagle Creek Bison Management Zone and important winter range. Bison will occasionally move into the proposed Emigrant withdrawal area. Bison are managed by The Interagency Bison Management Plan which is a cooperative, multi-agency effort that guides the management of bison in and around Yellowstone National Park. The goal of the plan is to reduce the risk of disease (brucellosis); maintain a wild, free-ranging bison population; and protect the economic interest and viability of Montana's livestock industry. Habitat associations include: River valleys, and on prairies and plains. Typical habitat is open or semi-open grasslands, as well as sagebrush, semiarid lands, and scrublands. Both withdrawal areas have a limited amount of potential bison habitat.

Mule and White-tailed Deer

Both mule deer and white-tailed deer are common in both withdrawal areas, with mule deer distributed widely throughout the range, and white-tailed deer most common along major riparian zones. The area is part of the Southern Mountains deer population management unit.

Emigrant and Crevice

Table 10 displays Federally ESA listed species, Forest Service sensitive species, MIS, and those special interest species, identify above, within the proposed withdrawal areas.

Table 10. Species that are Federally ESA listed, Forest Service sensitive, MIS, and/or special interest species (identify above) their occurrence, or habitat potential, within the proposed withdrawal areas.

Common name (*Scientific name*)	Status	Occurrence
Canada lynx *(Lynx Canadensis)* and Critical Habitat	FT	- A query of MTNHP, September 2017, indicated 1 record (1970-2015) of a lynx observed within the Crevice withdrawal area and none in the Emigrant withdrawal area. - 15,163 acres mapped critical habitat within Emigrant. - 11,871 acres mapped critical habitat within Crevice.
Wolverine *(Gulo luscus)*	Proposed FT, FSS	- Data queried in MTNHP recorded reveals few observations in both withdrawal areas. - The entire proposed Emigrant withdrawal area is considered suitable habitat including male and female dispersal habitat and 8,880 acres are considered maternal habitat. - The proposed Crevice withdrawal area has 7,078 acres of primary habitat, the entire area is considered wolverine male dispersal habitat and 14,832 acres are considered female dispersal habitat with 697 acres considered maternal habitat.
Grizzly bear *(Ursus arctos horriblis)*	FSS, MIS	- Approximately half of the proposed Emigrant withdrawal is in the primary conservation area, the other half is in the demographic monitoring area, in the Mill Creek Bear Analysis Unit, with 12,568 acres mapped as grizzly bear secure. - The entirety of the proposed Crevice withdrawal area is in the Greater Yellowstone Ecosystem primary conservation area with 6,302 acres mapped as grizzly bear secure habitat.
Gray wolf *(Canis lupus)*	FSS	- There are no known den or rendezvous sites or established packs within the project area and the project. - Individuals have been observed within both project areas.
American peregrine falcon *(Falco peregrinus anatum)*	FSS	- There are no known active eyries at this time. - There is suitable habitat in both withdrawal areas and they have been observed in both withdrawal areas.

Common name (*Scientific name*)	Status	Occurrence
Bald eagle *(Haliaeetus leucocephalus)*	FSS, MIS	- There is suitable habitat in both withdrawal areas and they have been observed in both withdrawal areas. - There are no known nests in the proposed Emigrant area at this time. - In 2014, structured surveys were conducted and 19 nests were identified in the proposed Crevice withdrawal area. (MTNHP 2017).
Black-backed woodpecker *(Picoides arcticus)*	FSS	- Observations have been reported in both withdrawal areas (ebird 2017).
Flammulated owl *(Otus flammeolus)*	FSS	- Structured surveys were completed in both withdrawal areas in 2013 with no positive results. - There are no known observations in either withdrawal area, but the proposed Emigrant withdrawal area has suitable habitat and is considered a potential species for the area.
Harlequin duck *(Histrionicus histrionicus)*	FSS	- Few occurrences have been observed in the proposed Crevice withdrawal area and they have potential to be present in the proposed Emigrant withdrawal area.
Trumpeter Swan *(Cygnus buccinators)*	FSS	- Both withdrawal areas have non-breeding habitat. - Trumpeter Swans have been observed in the proposed Crevice withdrawal area and they have to potential to be present in the proposed Emigrant withdrawal area.
Bighorn sheep *(Ovis canadensis)*	FSS	- The proposed Crevice withdrawal area has 13,000 acres of occupied habitat. - The proposed Emigrant withdrawal area is not considered occupied habitat but has the potential for this species to be present.
Townsend's big-eared bat *(Corynorhinus townsendii)*	FSS	- There are a few known openings from old mining within the proposed Emigrant withdrawal area. A few bat closures in the proposed Emigrant area have been erected, but most addicts have self-closed, and bat research is being conducted at Mill Creek, a drainage to the north. - Although not observed there is potential for bats to be present in the proposed Crevice withdrawal area.
Northern goshawk *(Accipiter gentilis)*	MIS	- No known post fledgling areas are identified in either of the withdrawal areas. - The proposed Emigrant withdrawal area contains 4,138 acres of potential goshawk nest habitat. - The proposed Crevice withdrawal area contains 8,131 acres of potential goshawk nest habitat.
Rocky mountain elk *(Cervus elaphus)*	MIS	- Within the proposed Emigrant withdrawal area approx. 65% of acres have been mapped as 'secure' elk habitat (10,879 acres). - Within the proposed Crevice withdrawal area approx. 15% of acres have been mapped as 'secure' elk habitat (2,548 acres).
Pine marten *(Martes Americana)*	MIS	- Average of 10-20 annual credible observations are recorded in the withdrawal areas.
Bison *(Bison bison)*	**	- Within the proposed Emigrant withdrawal area approx. 5% (1,480 acres) of acres are mapped as potential bison habitat. - Within the proposed Crevice withdrawal area approx. 25% (4,391) of acres are mapped as potential bison habitat.
Deer (White-tail and Mule) *(Odocoileus hemionus)*	**	- Both species are known to frequent both proposed withdrawal areas.

*FT = Federal Threatened, FSS = Forest Service Sensitive Species, MIS = Management Indicator Species, ** = special interest species.*

Migratory Birds

The project area is within Bird Conservation Region (BCR) 10 and there are 22 Birds of Conservation Concern (BCC) within this region (USFWS 2008, and Montana Partners in Flight 2000). The BCC identified for this project are all associated with forested environments, and

utilize a variety of habitat components. The project record contains a list the migratory bird BCC that have the potential to be found in the project area.

3.5 Botanical Species

Forest Service Manual 2672.4
Ensure that Forest Service actions do not contribute to the loss of viability of any native or desired non-native plant animal species or contribute to trends toward Federal listing of any species.

Vegetation is typical of mountainous areas at this latitude in the intermountain west. The lowest elevations are sagebrush/grasslands. The foothills are either lush mountain meadows with scattered aspen stands, or steeper hillsides with sparser vegetation of mostly grasses. Forested areas include aspen, lodgepole pine, Douglas fir, whitebark pine, subalpine fir, Engelmann spruce, ponderosa pine, and limber pine. During a field reconnaissance in July 2017, mortality to whitebark pine from whitebark pine blister rust was evident. Whitebark pine, a candidate for Federal listing and a keystone species for the Greater Yellowstone Area can be found within both areas, as well as numerous brushes, shrubs, and flowering plants.

As part of a Forest wide standard there is an integrated weed control program in cooperation with the state of Montana and County Weed Boards to confine present infestation and prevent establishment of new areas of noxious weeds. Noxious weeds can be found within both proposed withdrawal areas.

Analysis Measures

The indicators for effects are the type and number of species affected and/or the direction of changes in acres of habitat impacted. Species are grouped into categories based on their statuses: federally listed with the ESA, species considered sensitive by the Forest Service, and invasive weed species.

Endangered Species Act

Section 7 of the ESA directs all Federal agencies to use their existing authority to conserve threatened and endangered species and, in consultation with the USFWS, to ensure that their actions do not jeopardize listed species. Section 7 applies to management of Federal lands as well as other federal actions that may affect listed species. There are no known or suspected ESA listed botanical species within either proposed withdrawal area.

Candidate for Federal Listing Whitebark Pine

Whitebark Pine was federally designated as a candidate species on July 19, 2011 and is also considered a Forest Service Sensitive Species. Whitebark pine is a five-needled conifer species typically 16 to 66 feet (5 to 20 meters) tall with a rounded or irregularly spreading crown shape. Its characteristic dark brown-to-purple seed cones are 2 to 3 inches (5 to 8 centimeters) long and grow at the outer ends of upper branches. The seeds are dispersed almost exclusively by Clark's nutcrackers, a jay-like bird of high altitude forest habitats. Whitebark pine is a slow-growing, long-lived tree with a life span of up to 500 years and sometimes more than 1,000 years.

Forest Service Sensitive Species

Sensitive species are defined as "those plant and animal species identified by a Regional Forester for which population viability is a concern". It is the policy of the Forest Service regarding

sensitive species to as part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species (FSM 2670.32). Forest Service sensitive species known to occur or have potential to occur within the proposed Emigrant and/or Crevice withdrawal areas are displayed in Table 11 below.

Invasive Species, EO 13112 of February 3, 1999

EO 13112 (February 3, 1999) addresses the prevention of the introduction of invasive species and provides for their control and minimization of the economic, ecological, and human health impacts the invasive species causes. This EO establishes the Invasive Species Council, which is responsible for the preparation and issuance of the National Invasive Species Management Plan, which details and recommends performance-oriented goals and objectives and specific measures of success for federal agencies.

Emigrant

Elevations, within the proposed Emigrant withdrawal area, range from 6000 to 10,900 feet with approximately three-quarters of the area over 8,000 feet. The lower elevations are confined to the far western boundary of the withdrawal and along the Emigrant and Six Mile Creek riparian corridors. The topology is generally steep with a majority of the area having 40 percent slopes or greater. The proposed Emigrant withdrawal area is mainly contained within the montane and subalpine zones. These encompasses a variety of vegetative types from subalpine forest, mountain grassland, alpine meadows, mountain shrublands and montane forest. About 25 percent of the area is sparsely vegetated, due to the steep slopes. Roughly 65 percent of the area is dominated by stands of lodgepole pine, Douglas-fir and whitebark pine.

Forest Service Sensitive Species

There are three known sensitive plant species that occur within the proposed Emigrant withdrawal boundary, whitebark pine, Austin's knotweed, shoshonea. Table 11 provides information about Forest Service sensitive species known or suspected within the proposed Emigrant and Crevice withdrawal areas.

Invasive Species

Known invasive weed species in the proposed Emigrant withdrawal area are not abundant at this time. The terrain has made it difficult for roads and trails, which are a common vector for introduction and dispersal of invasive species. In the northeast corner, spotted knapweed and hounds tongue are present along road 3274 and road 3273. In the southwest corner a number of weeds exist along road 348 and the trailhead for trails 61 and 606. While the mapped weed occurrences fall almost completely outside of the withdrawal area, the presence of these infestations along transportation corridors adjacent to or within the withdrawal provide opportunities for expansion into the withdrawal area.

Crevice

Elevation, within the proposed Crevice withdrawal are, range from 5,300 to 9,200 feet with approximately three-quarters of the withdrawal unit being over 7,000 feet. The lower elevations generally occur in the southwest corner and up the Bear Creek drainage and are characterized by dry shrub and grass types with some Douglas fir dominated stands. The topology varies with roughly half the area having slopes 40 percent or greater and with the other half having slopes under 20 percent. Overall the proposed withdrawal area encompasses a variety of vegetative types from subalpine forest, mountain grassland, mountain shrublands and montane forest. Roughly 75

percent of acres are tree dominated stands with lodgepole, Douglas-fir, subalpine fir, Engelmann spruce, and whitebark pine.

Forest Service Sensitive Species

There are three known sensitive plant species that occur within the proposed Crevice withdrawal boundary, whitebark pine, beaked spikerush, and shoshonea. Table 11 provides information about Forest Service sensitive spices known or suspected within the proposed Emigrant and Crevice withdrawal areas.

Invasive Species

There are many known populations of invasive weed species in the proposed Crevice withdrawal area. Road and trail systems occur throughout the proposed Crevice withdrawal area and most contain weed infestations. There are large populations of weeds in the southwest corner of the withdrawal area. Habitats in this area are primarily dry grass or dry shrub habitat which are highly susceptible to invasive species.

Table 11. Forest Service sensitive and their occurrence within the proposed withdrawal areas.

Common name (*Scientific name*)	Status	Occurrence: Emigrant	Occurrence: Crevice
Whitebark pine *(Pinus albicaulis)*	ESA Candidate, FSS	3,035 acres	330 acres
Austin's knotweed *(Polygonum austiniae)*	FSS	30 acres	none
Beaked spikerush *(Eleocharis rostellata)*	FSS	none	10 acres
Shoshonea *(Shoshonea pulvinata)*	FSS	200 acres	80 acres

ESA Candidate = Species considered candidates for ESA listing, FSS = Forest Service Sensitive Species

3.6 Hydrology

There are a number of relevant laws, acts and executive orders that feed into the analysis measures for hydrological components. Discussed briefly below are those legal framework aspects to assist in understanding specific assessments for surface water quality and quantity, as well as groundwater hydrology and quality.

Forest Plan Goal

Meet or exceed State of Montana water quality standards.

Analysis Measures

Federal Clean Water Act (CWA)

This Act requires Federal Agencies to comply with all Federal, State, and local requirements, administrative authority, process and sanctions related to the control and abatement of water pollution (CWA, Sections 313(a) and 319(k), USC 2002). Under the CWA, the state of Montana has been given authority to develop, review, and enforce water quality standards under Section 303. The Clean Water Act requires the development of Total Maximum Daily Loads (TMDLs) that will provide conditions that can support all identified uses. Section 404 of the Clean Water Act gives authority to the Corps of Engineers to review and permit activities that may impact navigable waters of the U.S and adjacent wetlands.

State of Montana Water Quality Regulations

The State of Montana maintains primacy with respect to water quality standards and pollutant discharge management programs. This primacy status requires that the provisions of the State of Montana Water Quality Act meet or exceed all requirements of the Federal Clean Water Act. The State of Montana Water Quality Act requires the state to protect, maintain, and improve the quality of water for a variety of beneficial uses. Defined beneficial uses can be grouped into three broad categories: recreation, aquatic life, and water supply. Section 75-5-101, Montana Code Annotated establishes water quality standards based on these beneficial uses.

Every two years the Montana DEQ compiles a list of water bodies that fail to meet water quality standards. This list is known as the "303(d) list". The 303(d) list identifies the probable causes of impairment as well as the suspected sources of the pollutant. The most recent available 303(d) list is the 2016 release (Montana DEQ 2016). Montana DEQ is required to develop TMDLs for all water bodies on the 303(d) list. According to Montana Integrated Water Quality Report protocol, the group of water bodies classified as "Category 5" make up the "303(d) list". The fact that a particular water body has been designated as a Category 5 stream segment (and therefore appears on the 303(d) list) does not preclude management activities from taking place within its watershed.

Executive Order 11990 – Protection of Wetlands

EO 11990 requires the identification, assessment, and protection of wetlands by mandating Federal agencies to avoid, if possible, and practicable, adverse impacts to wetlands and to preserve and enhance the natural and beneficial values of wetlands.

Executive Order 11988 – Floodplain Management

EO 11988 requires Federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. FSM 2527.05 defines the base floodplain as "the lowland and relatively flat areas joining inland and coastal water including the debris cones and flood-prone areas of offshore islands and, at a minimum, that area subject to a 1 percent (100-year occurrence) or greater chance of flooding in a given year.

Emigrant

The proposed Emigrant withdrawal area includes portions of three 6th field HUC watersheds and contains close to 30 liner miles of streams. Emigrant Creek (HUC 100700020206) and its tributary East Fork Emigrant Creek drain the central portion of the proposed withdrawal area. Sixmile Creek (HUC 100700020205) and its tributaries North Fork Sixmile Creek, Gold Prize Creek, and Gold Run Creek drain the south and west portions of the proposed withdrawal area. West Fork Mill Creek (HUC 100700020303) and its tributaries Arrastra Creek and Coffee Pot Creek drain the eastern edge of the proposed withdrawal area.

The Montana DEQ noted that the Emigrant mining district "has been the site of small scale lode and placer operations since the 1870's" (Montana DEQ 2017b). Evidence of past placer mining is visible in many locations along Emigrant and East Fork Emigrant Creek, mainly in the form of old excavation areas and waste rock piles. Geologic Systems (2015) noted that the stream segment of Emigrant Creek starting approximately 1.25 miles below the mouth of East Fork Emigrant Creek and extending approximately 1 mile up East Fork Emigrant Creek was "heavily

worked in early years" by placer miners. McCulloch (1999) noted that ground-sluicing occurred above ferricrete layers, drifting in and below ferricrete layers, and hydraulic mining between the forks of Emigrant Creek and the lower falls. In addition to placer mining effects, groundwater and surface water quality impairments attributable to naturally occurring sulfide-rich rock bodies and historic lode mining have been documented in the area.

Surface Hydrology

Records maintained by the Montana Department of Natural Resources and Conservation Water Resources Division (http://ftp.geoinfo.msl.mt.gov/Data/Spatial/NonMSDI/DNRC_WR/) document the active surface water rights (Table 14) within the proposed Emigrant withdrawal area. Existing water rights may be seasonal and in effect only during various portions of the year.

Groundwater Hydrology

Groundwater hydrology in proposed Emigrant withdrawal areas drainages follow the general model for groundwater flow in alpine watersheds outlined in Manning and Caine (2008): "groundwater flow in alpine watersheds most often occurs in near-surface, relatively high-permeability zones (active zones) that generally overlie deep zones of low permeability." This conceptual model is supported by presence of steep topography in the Emigrant drainage (which likely directs shallow groundwater toward streams in the valley bottoms of streamside springs), the corresponding presence of low-flow artesian boreholes at lower elevations on valley slopes, and the steady downstream increase in measured stream flow in the East Fork and Emigrant Creek which indicates minimal loss to a deeper flow system (Montana DEQ 2017b). The hydrogeological evidence does not indicate there is a direct connection between groundwater in the Emigrant Creek subwatershed and the geothermal spring systems feeding Chico Hot Springs and Yellowstone National Park's geothermal features (Sonderegger 1984; Kharaka et al 1991; Kharaka et al 2002; LaFave 2016; Montana DEQ 2017b).

Picture 3. Orange ferrous precipitate ferricreteis visible East Fork Emigrant Creek near its confluence with Emigrant Creek.

Records maintained by the Montana Department of Natural Resources and Conservation Water Resources Division (http://ftp.geoinfo.msl.mt.gov/Data/Spatial/NonMSDI/DNRC_WR/) document the active ground water rights (Table 14) within the proposed Emigrant withdrawal area. Existing water rights may be seasonal and in effect only during various portions of the year.

Federal and State of Montana Water Quality Regulations

The Montana DEQ has classified all streams within the proposed Emigrant withdrawal areas as Category B-1 Streams. The B-1 Classification is designed to protect a variety of beneficial uses including drinking, culinary, and processing purposes (after conventional treatment), recreation, growth and propagation of salmonid fisheries, and agricultural and industrial water supply.

One stream segment within the Sixmile is listed as impaired and in need of TMDL development by Montana DEQ 2016 Integrated Water Quality Integrated Report 303(d) list: Sixmile Creek from the Absaroka-Beartooth Wilderness to the National Forest boundary (Montana DEQ, 2016). The listed causes are "sediment/siltation" and "other anthropogenic substrate alterations" and the listed sources are "placer mining" and "loss of riparian habitat." The TMDL has not been completed for this stream segment. The DEQ has assessed that aquatic life is partially supported due to sedimentation and the cold water fishery is partially supported due to sedimentation and large woody debris removal (Montana DEQ, 2017a).

No other stream segments within the proposed Emigrant withdrawal area are Montana DEQ 2016 Integrated Water Quality Integrated Report 303(d) list and thus no TDMLs are required.

Wetlands

Wetland information was available for the northern portion of the proposed Emigrant withdrawal area, which constituted approximately 42 percent of the total Area. No wetlands data was available for the southern portion of the area. Based on available information, there are a total of 26.7 acres of mapped wetland areas in the proposed Emigrant withdrawal area.

Floodplains

Based on the Federal Emergency Management Agency's National Floodplain Map, for Park County Montana, 0 acres of the proposed Emigrant withdrawal area are in an identified 100 year floodplain.

Crevice

The proposed Crevice withdrawal area includes portions of three 6th field HUC watersheds. Yellowstone River – Reese Creek (HUC 100700010902) contains Eagle Creek and its tributary Davis Creek which drains the western edge of the withdrawal area. Bear Creek (HUC 100700010901) and its tributaries Pole Creek, North Fork Bear Creek, East Fork Bear Creek, Darroch Creek, Pine Creek, and Palmer Creek drain the remainder of the proposed withdrawal area. Yellowstone River – Crevice Creek (HUC 100700010806) contains the southern portion of the Crevice Mountain area and includes one named stream (Malin Creek).

Gold and arsenic have been the primary products of the Jardine district since its inception. The most recent mining in the Jardine area was the Mineral Hill mine, which entered full production in 1989 and was closed in 1996. In 2001, physical reclamation of the mine and two tailings impoundments was completed with a biological treatment system to treat seepage. As part of the mine closure agreement, surface and groundwater sampling in the area started in 1997 and has continued on an annual basis. This monitoring has documented ongoing water quality problems associated with past mining at the site (TVX Mineral Hill 2017).

Surface Hydrology

Records maintained by the Montana Department of Natural Resources and Conservation Water Resources Division (http://ftp.geoinfo.msl.mt.gov/Data/Spatial/NonMSDI/DNRC_WR/) document the active surface water rights (Table 14) within the proposed Crevice withdrawal area. Existing water rights may be seasonal and in effect only during various portions of the year.

Groundwater Hydrology

Groundwater hydrology in proposed Crevice withdrawal area, with the exception of the Yellowstone River- Crevice Creek, drainages follow the general model for groundwater flow in alpine watersheds outlined in Manning and Caine (2008): "groundwater flow in alpine watersheds most often occurs in near-surface, relatively high-permeability zones (active zones) that generally overlie deep zones of low permeability." In addition to groundwater moving through more permeable near surface alluvial and glacial deposits, it is likely that the numerous geologic faults in the area also convey subsurface groundwater flow toward the Gardner fault and the Yellowstone River valley. Both near surface and deeper groundwater move to the north, contributing to deep regional groundwater flow to the south of the Gardner fault, which then flows down the Yellowstone River valley.

The Yellowstone River- Crevice Creek groundwater hydrology has not been comprehensively studied in the portion of the watershed that intersects the proposed withdrawal area. There is evidence that groundwater is scarce. However, during exploration associated with the Crevice Tunnel Project during the late 1990's, unexpected high groundwater flow areas were encountered at the Palmer fault intersection. This occurred even with pre-project analyses, which predicted that little water would be encountered in the tunnel (USGS 1996). Based on this information it is reasonable to assume that there is the possibility of encountering unexpected, relatively large quantities of groundwater flow in certain locations. The probability of predicting where such locations will occur is relatively low without additional subsurface drilling and hydrogeological modelling.

Records maintained by the Montana Department of Natural Resources and Conservation Water Resources Division (http://ftp.geoinfo.msl.mt.gov/Data/Spatial/NonMSDI/DNRC_WR/) document the active ground water rights (Table 12) within the proposed Crevice withdrawal area. Existing water rights may be seasonal and in effect only during various portions of the year.

Table 12. Active surface and groundwater rights within the proposed Emigrant and Crevice withdrawal areas.

Proposed withdrawal area: Stream Name	Active Surface Water Rights	Active Groundwater Rights
Emigrant: Emigrant Creek	3	0
Emigrant: Sixmile Creek	5	4
Emigrant: West Fork Mill Creek	2	1
Crevice: Bear Creek	45	30
Crevice: Yellowstone River-Crevice Creek	2	2
Crevice: Yellowstone River-Reese Creek	0	0

Federal and State of Montana Water Quality Regulations

The Montana DEQ has classified all streams within the proposed Crevice withdrawal areas as Category B-1 Streams. The B-1 Classification is designed to protect a variety of beneficial uses including drinking, culinary, and processing purposes (after conventional treatment), recreation, growth and propagation of salmonid fisheries, and agricultural and industrial water supply.

Two stream segments within Bear Creek watershed have been assessed by Montana DEQ. These segments occur on Palmer Creek and Bear Creek. The DEQ has classified Palmer Creek as Category 3. A segment of Bear Creek is listed as impaired and in need of TMDL development by Montana DEQ 2016 Integrated Water Quality Integrated Report 303(d) list. The listed causes are "low flow alterations" and "water temperature" and the listed sources are "placer mining" and "loss of riparian habitat." The Forest Service (USDA FS 1986) asserted that the presence of arsenic in Bear Creek is attributable, in part, to waste and seeps associated with the reprocessing site, tailings impoundments, and various dumps that pre-dated the TVX Mineral Hill Mine.

Picture 4. Bear Creek above confluence with Yellowstone River.

Bear Creek water quality has been affected by arsenic that occurs naturally in the area as well as mine waste. As part of the TVX Mineral Hill Mine closure requirements, surface water sampling has been undertaken annually at two locations on Bear Creek since 1999. Results of this sampling can be found within the project record. The Bear Creek tributary water sample also exceeded standards for chromium and nickel. Concentrations of iron and manganese exceeded secondary drinking water standards at several sample sites. TVX Minerals Inc. (2017) noted that "all the sampling sites are likely affected by historic mine working in the area and natural mineralization."

No other stream segments within the proposed Emigrant withdrawal area are Montana DEQ 2016 Integrated Water Quality Integrated Report 303(d) list and thus no TDMLs are required.

Wetlands

Wetland information was available for the entire proposed Crevice withdrawal area and indicated there are a total of 49.5 acres of mapped wetland areas in the proposed Crevice withdrawal area.

Floodplains

Based on the Federal Emergency Management Agency's National Floodplain Map, for Park County Montana, 0.5 acres of the proposed Crevice withdrawal area are in an identified 100 year floodplain.

3.7 Aquatic Species

Discussions from the above section 3.6 Hydrology about stream water quantity, wetlands, floodplains, and groundwater all feed into the affected environmental for aquatic species.

Forest Plan Goal

Manage and restore aquatic habitats to sustain fully functioning aquatic ecological systems and native species diversity, as determined by suitability and capability of those ecosystems, and to meet aquatic management goals of Montana Fish, Wildlife, and Parks, other agencies, and State water quality standards.

Analysis Measures

Species are grouped into categories based on their statuses: federally listed with the Endangered Species Act, species considered sensitive by the Forest Service, and Forest Plan identified management indicator species.

Endangered Species Act

Section 7 of the ESA directs all Federal agencies to use their existing authority to conserve threatened and endangered species and, in consultation with the USFWS or National Marine Fisheries Service (NMFS), to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of Federal lands as well as other Federal actions that may affect listed species.

There are currently no federally listed threatened or endangered aquatic species (including amphibians), designated critical habitat, or proposed critical habitat occurring within the project area.

Petition to list Lednian Stonefly

On October 4, 2016 the USFWS issued its 12-month finding on a petition to list the meltwater lednian stonefly (Lednia tumana) and western glacier stonefly (Zapada glacier) as threatened under the Endangered Species Act (Federal Register Vol. 81, No. 192). The USFWS concluded that listing these species is warranted and that if finalized, this rule would extend ESA protections to these species. Both species require high-elevation, fishless, alpine streams linked to glacial meltwater sources. Because there are few glacier meltwater sources and no known occurrences of these species in the project area, this analysis does not further consider effects to these two species.

Forest Service Sensitive Species

Sensitive species are defined as "those plant and animal species identified by a Regional Forester for which population viability is a concern". It is the policy of the Forest Service regarding sensitive species to as part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species (FSM 2670.32). Forest Service sensitive species known to occur or have potential to occur within the proposed Emigrant and/or Crevice withdrawal areas are displayed in Table 14 below.

Forest Plan Management Indicator Species

Forest Service Manual 2620.5 defines Management Indicator Species (MIS) as "plant and animal species, communities or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (FSM 2620). Identified aquatic MIS for Custer Gallatin NF are: native trout. Regulations at 36 CFR 219.19(a)(1) require that certain vertebrate and/or invertebrate species present in the area be identified as MIS within the planning area (Custer Gallatin NF) and that these species be monitored, as "their population changes are believed to indicate the effects of management activities". Monitoring of MIS and determinations of population change occurs at the forest planning level. Table 13 is a summary of current trends for MIS found within the Custer Gallatin NF.

Table 13. Summary of population monitoring of MIS wild trout for the Custer Gallatin National Forest (Barndt 2011).

Species	Monitoring Report Conclusions
Wild Trout	Wild trout are generally common/abundant in suitable habitat on the Custer Gallatin National Forest. Across the Forest, populations of brook, brown, and rainbow trout are stable or increasing overall. Conservation efforts to improve and secure aquatic habitat for native YCT in the upper Yellowstone River Basin have resulted in increased abundance in many streams. Cutthroat are common or abundant in over 2/3 of occupied habitat on the Forest. Within the Mineral Withdrawal Project area, MIS in Eagle Creek and Bear Creek occur at densities expected for the type of aquatic habitat sampled. Wild fish populations in Sixmile and North Fork Sixmile Creeks are still recovering from wildfire and debris flows that occurred in 2013 and 2014, respectively. (Barndt 2011)

Emigrant

Emigrant Creek

Aquatic habitat characteristics in Emigrant Creek and East Fork Emigrant Creek are a result of relatively high stream gradient and anthropogenic disturbance. Aquatic habitat units occur primarily as high gradient riffles interspersed with steep cascades where valley width decreases (CGNF 2017). Pools are primarily associated with scour around boulders and plunges over cascades. Mass wasting and stream bank erosion resulting both from historic and more recent mining activities are the primary sediment sources. Either as a result of reduced sediment delivery over time or high stream energy, there is relatively little accumulation of fine sediment in slow-water habitats where spawning sized gravel does occur.

Riparian areas are dominated by woody shrubs and younger conifers which provide limited stream shading or recruit-able large woody debris (LWD), and shrubs provide leaf litter which is a nutrient rich food source for macroinvertebrates.

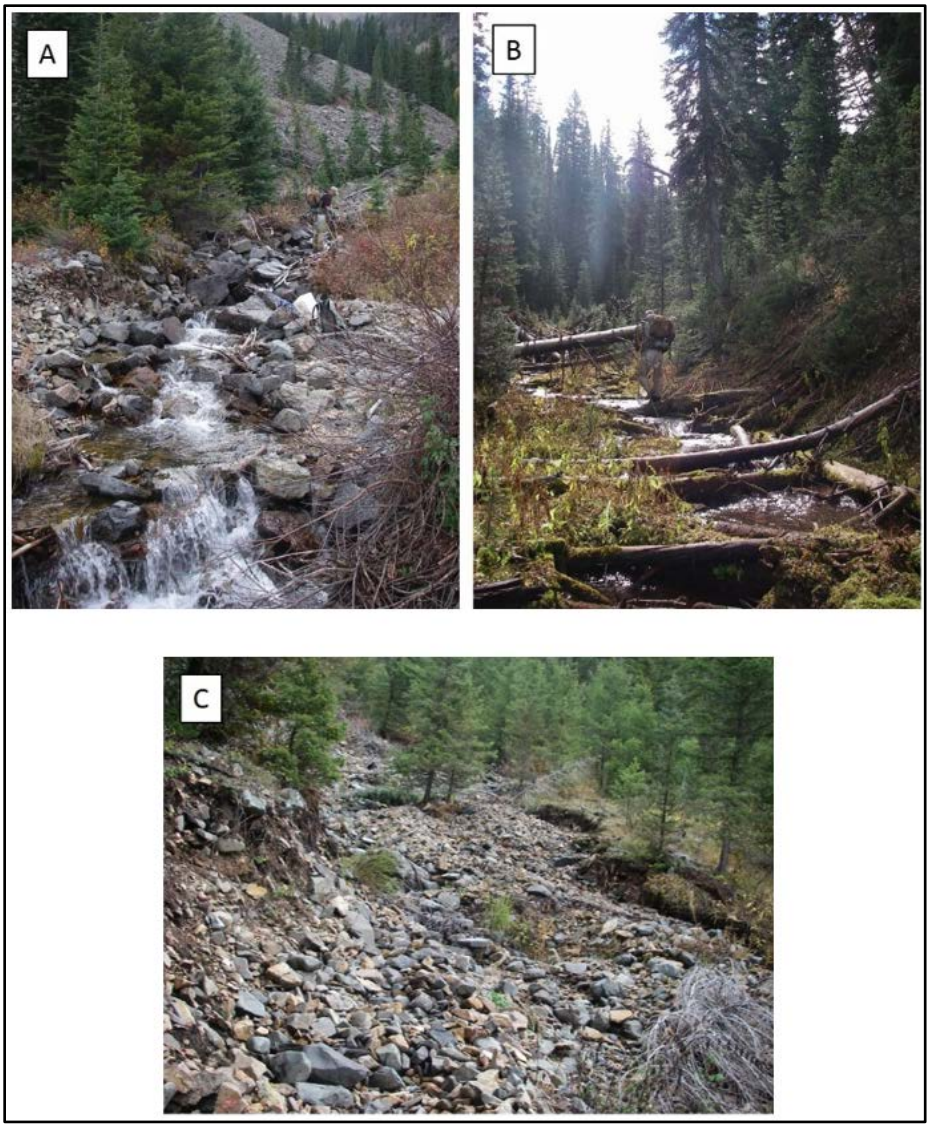
Sixmile Creek

Gold Run Creek and other first order tributary streams in the Sixmile HUC lack sufficient flow to support fish. Although stream size and gradient (10 percent average for first half mile above trailhead) in Gold Prize Creek may be suitable for fish. The road #348 culvert is an upstream barrier to fish colonizing Gold Prize Creek from Sixmile Creek.

West Fork Mill Creek

Cascades are the dominant habitat type in higher gradient confined reaches of Arrastra Creek (Picture 5 (A)). These occur along talus slopes where, water falling over boulders creates frequent plunge pools. Where stream gradient moderates and valley width increases to accommodate riparian forest, large woody debris is the primary pool forming feature (Picture 5 (B)). The middle, reach of Arrastra Creek located 1.4 miles upstream from the confluence with West Fork Mill Creek does not convey surface flow during summer months (Picture 5 (C)). Aquatic habitat near the mouth of Arrastra Creek is comprised primarily of high gradient riffle with scour pools occurring along vegetated stream banks and adjacent to in-channel boulders.

Picture 5. High gradient cascades(A), moderate gradient LWD step pools (B) and dry depositional channel (C) are some of the dominant aquatic habitat types in Arrastra Creek



Crevice

Bear Creek

Bear Creek and North Fork Bear Creek, the largest project area streams, are dominated by high gradient riffle habitat. Slow water habitat exists primarily as pocket pools within riffles and is created from scour around boulders. Streambanks and substrate are comprised of boulder and cobble. Deposits of spawning-sized gravel occur in low velocity areas such as channel margins and pocket pool tail-outs. LWD occurred occasionally as single pieces but was present primarily as infrequently spaced log jams. Aquatic habitat quality and complexity are excellent in Darroch Creek. Abundant boulders and LWD create frequent dam and scour pools. The middle reach of Palmer Creek is comprised of high gradient riffle and step-pool habitat. Boulders and cobble grade controls form step pools up to 12 inches deep.

The Crevice Mountain Road crossing of Palmer Creek is comprised of a culvert with its outlet perched approximately 18 inches above the water surface. This is of sufficient height to prevent upstream aquatic organism passage. Lower Palmer Creek near the confluence with Bear Creek is very steep, dewatered, and is at least a seasonal barrier to fish migration in and out of Bear Creek.

Pine Creek has relatively high stream gradient with boulder-formed step and scour pools containing a residual depth of 12 inches. Pool tail-outs are comprised primarily of cobble-sized particles but some small pockets of spawning gravel were present in low velocity areas. Aquatic habitat is fragmented by the outlet of the road #493 culvert which is perched approximately 18 inches above the water's surface.

Picture 6. Bear Creek above confluence with Yellowstone River

Yellowstone River- Crevice Creek

Aquatic habitat quality in Malin Creek is poor due to channel intermittency/insufficient flow. Due to channel intermittency/insufficient flow Malin Creek does not support fish and provides limited habitat for aquatic macroinvertebrates.

Yellowstone River- Reese Creek

Reese Creek is 1.5 mile-long stream segment has many lower gradient habitat units due to LWD recruitment from an extensive deciduous riparian area. This includes a 0.4 mile long section dominated by an extensive beaver dam complex. Accumulations of smaller dead woody vegetation provide additional habitat complexity and help maintain floodplain connectivity. Dense stands of cottonwood, aspen, alder, and willow provide stable undercut banks.

Accumulation of fine sediment in pools, beaver ponds, and lower gradient reaches limit the availability of fish spawning habitat and may limit macroinvertebrate production. However, much of this sediment is naturally derived as there are no readily apparent anthropogenic sediment sources. There are seven culverts on Eagle Creek and its tributary Davis Creek over their combined 6.3 mile length. At least four of these culverts are perched and are at least partial barriers to upstream aquatic organism passage.

Amphibian habitat in the Eagle Creek drainage is excellent due to isolated lentic habitats like Casey Lake as well as beaver ponds connected to Eagle Creek. The extensive riparian area likely provides a suitable migratory corridor.

Table 14. Forest Service sensitive, their occurrence, or habitat potential, within the proposed withdrawal areas.

Common name (*Scientific name*)	**Status**	**Occurrence**
Yellowstone Cutthroat Trout *(Oncorhynchus clarki bouvieri)*	FSS	- Within the proposed Emigrant withdrawal area there is 1.32 stream miles that contain potential Yellowstone Cutthroat Trout habitat. YCT are present within Simile Creek and possibly present within West Fork Mill Creek in low densities. - Within the proposed Crevice withdrawal area there are 9.26 stream miles that contain potential Yellowstone Cutthroat Trout habitat. YCT are present within Bear Creek and Yellowstone River- Reese Creek.
Boreal Toad *(Bufo boreas)*	FSS	- Within the proposed Emigrant withdrawal there is only 1 record (1917) MTNHP of a boreal toad along Emigrant Creek - Only 10% of the proposed Emigrant withdrawal area contains suitable habitat for boreal toads, however, less than 1% is considered 'optimal' suitable habitat. - Approx. 60% of the proposed Crevice withdrawal area contains suitable habitat for boreal toads, however, less than 1% is considered 'optimal' suitable habitat.

3.8 Economics

Local economies within the Greater Yellowstone Area are heavily dependent on uses and resources from the Federal lands. Local residents use Federal lands, as well as State lands, for outdoor recreation. The livestock industry utilizes forage from NFS lands to support viable year-around operations. Local lumber mills are dependent upon National Forests as a source of timber. Commercial outfitters and guides use federally managed land and water for large portions of their operations.

Forest Plan: Management Situation

Local economies are heavily dependent on uses and resources from the Federal lands. Local residents use Federal lands, as well as State lands, for outdoor recreation.

The IMPLAN Pro modeling software system was used to develop a regional economic input-output models. The input-output model was developed using 2015 IMPLAN data. The resulting input-output model provided the employment and labor income multipliers needed to estimate the secondary effects of the proposed project and the direct labor income for reclamation and monitoring of mining activities.

Analysis Measures

Employment

Input-output analysis is used a means of examining relationships, within an economy, between businesses, as well as relationships between businesses and final consumers. This type of analysis captures all monetary market transactions for consumption within a given time period. The resulting mathematical representation allows for an examination of the amount of change in economic activities within an entire economy (all other factors being constant). The results of the input-output analysis results in number of jobs, or employment.

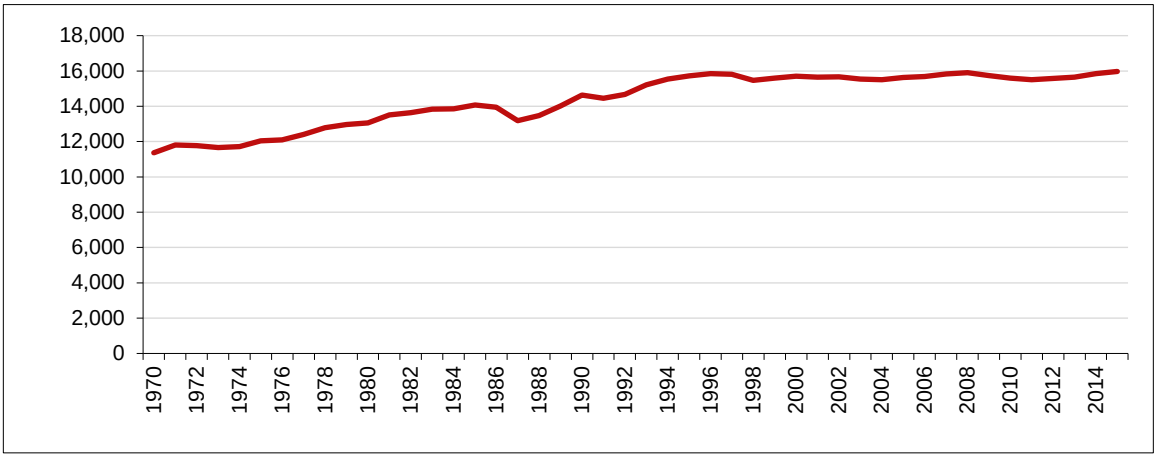
Emigrant and Crevice

The proposed Emigrant and Crevice withdrawal area exist in the southern end of Park County, near to Chico and Gardner, Montana, respectively. The population density of Park County various with low density across most of the county with a few small population centers including the county seat of Livingston (7,401 people), followed in size by Gardner (875 people).

Geographically, Park County is isolated from populations to the south, due to the intervening landscape of Yellowstone National Park, and the rural setting of Park County, Wyoming. To the east and west, Park County is bounded by the Absorkee and Gallatin mountain ranges, limiting commuting into Paradise Valley to the north (Livingston), and northwest (Bozeman), via the I-90 corridor.

Park County, Montana has a population of approximately 16,114 people, a population level that has not grown since 1995 (Figure 8). The county's population density averages about 5.6 people per square mile. The county is predominantly white (96 percent), with a median household income of $43,932 (80 percent of the national average); and approximately 12.3 percent of the population living below the poverty line (80 percent of the national average). Average annual wages reported by the Bureau of Labor Statistics (BLS) range between $11,680 and $69,274, depending on the industry. Mining industries, including fossil fuels, reported average annual wages at $55,616, in 2015.

Figure 8. Park County population trend between 1970 and 2015.



Employment

The U.S. Bureau Economic Analysis (BEA) in 2015 estimated there were 10,097 jobs in Park County. Table 15 provides a breakdown of the number of jobs, by industry, within Park County for the years 2001, 2005, 2010, and 2015. In 2015 there were an estimated 53 mining related jobs within Park County. Whereas for those industries related to tourism and visitation there was an estimated 3,104 jobs within Park County (retail trade: 998 jobs, arts, entertainment, and recreation: 573 jobs, and accommodation and food services: 1,533 jobs).

For a statewide perspective, in 2015 there were as estimated 2,235 ore mining related jobs within Montana. For that same year Park County mining employment made up less than 3 percent (53 jobs) of the states total mining related jobs.

Table 15. Park County employment numbers by industry for 2001, 2005, 2010, and 2015 (BEA).

Industries	2001	2005	2010	2015
Farm	632	561	584	655
Forestry, fishing, & ag. services	206	203	211	246
Mining (including fossil fuels)	27	35	50	53
Construction	871	995	735	776
Manufacturing	467	547	428	515
Utilities	51	45	47	36
Wholesale trade	107	69	87	132
Retail trade	1,084	1,096	929	998
Transportation and warehousing	228	188	186	191
Information	137	150	142	146
Finance and insurance	298	216	314	285
Real estate and rental and leasing	332	412	521	591
Professional and technical services	402	483	503	527
Management of companies and enterprises	na	na	na	46
Administrative and waste services	na	na	na	278
Educational services	116	112	173	142
Health care and social assistance	721	796	785	828
Arts, entertainment, and recreation	323	427	436	573
Accommodation and food services	1,270	1,346	1,348	1,533
Other services, except public administration	577	622	646	726

Industries	2001	2005	2010	2015
Government	825	859	822	820
Unclassified	170	321	322	0
Total Employment (number of jobs)	**8,844**	**9,483**	**9,269**	**10,097**

3.9 Heritage Resources

Forest Plan Goal

Locate and protect cultural resources to maintain their scientific and historical values.

The general area encompassing the proposed Emigrant and Crevice withdrawal area has long been considered Crow Territory. However, the Shoshoni are known to have inhabited the area based upon ceramic and steatite artifacts, mussel shell beads, pipes, and projectile points recovered in Park County (Lahren 2006). In addition, numerous other tribes, including the Arapaho, Assiniboine, Blackfeet, Cheyenne, Chippewa, Cree, Kutenai, Metis, Nez Perce, Pond d' Oreille, and Sioux frequented the area (Lahren 2006).

Euro-American presence near the area can be traced back at least to 1806 when William Clark coursed eastward down the Yellowstone River on his return trip to St. Louis, marking the end of the Lewis & Clark/Corps of Discovery Expedition. Clark never explored up the Yellowstone River, toward the south from present-day Livingston, during this time, but for the next thirty years this area would be visited by countless explorers, miners, or trappers. The winter of 1844-45 documented the famous mountain man Jim Bridger as spending the winter with Crow Indians near Emigrant (Romans and Romans no date).

Analysis Measures

The measurement indicators used for cultural resources are the potential adverse effects to the 57 historic properties (those cultural resources considered eligible for the National Register of Historic Places (NRHP)) as defined by the 36 CFR 800 regulations. For this analysis, those cultural resource properties that have not been formally evaluated for nomination to the NRHP are treated as historic properties.

National Historic Preservation Act

The National Historic Preservation Act (NHPA) and its implementing regulations require Federal Agencies to consider the effects of their undertakings on historic properties. 36 CFR 800 outlines the set of procedures established by the NHPA that Federal Agencies must follow before implementing an action that may affect historic properties. In carrying out the responsibilities under Section 106 of the NHPA, the Forest Service is required to consult with any tribe that attaches religious and cultural significance to such properties when any federal undertaking may affect them {16 USC 470a(d)(6)(A)}. The proposed Emigrant and Crevice withdrawal areas lies within the Crow Nation Territory, as defined by the Treaty of Fort Laramie with Sioux, etc., 1851 (Medicine Crow and Press 1966).

Emigrant and Crevice

The 1825 Friendship Treaty between the United States and the Crow Tribe acknowledged the term "Crow Country" but did not define the boundaries. One of the treaty agreements was that the Crow would "…give safe conduct: of persons authorized by U. S. to travel through the Crow Country." and "…protect the lives and properties of U. S. employees living temporarily in the Crow Country." The 1851 Fort Laramie Treaty set aside approximately 38.8 million acres of territory as Crow Country (see Medicine Crow 1966 for a description of this territory boundary) which included the lands of the upper Yellowstone River drainage to the east of the river mid-channel. During the 1860s the Crow continued to assert their claim to lands east of the Yellowstone River and hostile

encounters between the Crow and miners were frequent. To the Crow the mining activity that was going on in the Emigrant Gulch and Bear Gulch areas was not "temporary" nor did it represent actions of "persons traveling through Crow Country" (Medicine Crow and Press 1966).

With growing pressure from homesteaders, miners, ranchers, and railroad speculators the need to renegotiate again with the Crow was facilitated by the Treaty of 1868. This treaty established the Crow Reservation at just over 8 million acres in size, again with the western boundary to the east of the Yellowstone River mid-channel. At least two subsequent land cessions during the late 1890s and early 1900s resulted in the Crow Reservation eventually reduced to approximately 3 million acres. These renegotiations gradually resulted in more and more ceded lands surrounding Emigrant Gulch and Bear Gulch opened up to mining activity.

Despite these massive reductions to their reservation lands the Crow have not altered their view toward the broader landscape they still consider Crow Country. Provisions in the Ft. Laramie Treaties include the tribal reserved rights to hunt on "all unoccupied lands of the United States". In addition to hunting, traditional practices such as harvesting teepee poles and gathering medicinal plants are also recognized. Many distant places located off their reservation share as keen a traditional importance as do places on, and adjacent to, their reservation and even today many of these places are visited and used by the Crow.

Past cultural resource inventories have concentrated in more accessible areas rather than in the rugged mountains. Not only have more prehistoric artifacts, especially diagnostic projectile points, been found on the surface in the foothill and flatland settings, but this is where the majority of subsurface excavation have been conducted. Hundreds of prehistoric artifacts have been recovered during these excavation projects compared to less than 100 within the proposed Emigrant and Crevice withdrawal areas.

Sixty-one cultural resource investigations, which directly or partially overlap with the proposed Emigrant or Crevice withdrawal areas, have been conducted since 1957. Fifty-seven cultural sites have been recorded. Six within the proposed Emigrant withdrawal area (Table 16) and 51 within the proposed Crevice withdrawal area (Table 17).

Table 16. Publicly available information for the six identified cultural resource sites within the proposed Emigrant withdrawal area.

Site No.-NRHP Status	Site type
24PA0157-U	Lithic artifact scatter-prehistoric occupation
24PA0160-U	Lithic artifact scatter-prehistoric occupation
24PA0674-U	Lithic artifact scatter-prehistoric occupation
24PA1266-U	Mine adit
24PA1267-U	Mine adit – Allison Tunnel
24PA1540-U	B-47E Stratojet Bomber Crash Site

Table 17. Publicly available information for the 51 identified cultural resource sites within the proposed Crevice withdrawal area.

Site No.-NRHP Status	Site type/Owner
24PA0301 (24PA0325)-E	Eagle Creek Site-prehistoric occupation
24PA0159-U	Lithic artifact scatter-prehistoric occupation
24PA0185-U	Mining – Mineral Hill Cabin
24PA0410-U	Mining – cabin & stock shed Pine Creek or Stuart-Schultz Cabins
24PA0411-U	Mining – Crevice Cabin
24PA0169-U	Lithic artifact scatter-prehistoric occupation – Casey Lake
24PA0172-U	Lithic artifact scatter-prehistoric occupation – Unnamed Lake Knoll

Site No.-NRHP Status	Site type/Owner
24PA0173-U	Parker Point Quarry-prehistoric occupation
24PA0340-U	Lithic artifact scatter-prehistoric occupation – Sargon's Site
24PA0352-U	Mining – Montana Vindicator Gold Mine Company
24PA0353-U	Mining – Snowshoe Mine
24PA0354-U	Mining – Jones Cabin
24PA0355-U	Mining - cabin
24PA0356-U	Mining – adit & ditch
24PA0357-U	Mining - dam
24PA0358-U	Forest Service Cabin
24PA0359-U	Mining – cabin
24PA0360-U	Mining – cabin
24PA0361-U	Mining – cabin
24PA0362-U	Mine adit
24PA0363-U	Mining – Watson Mine (Red Cabin was removed)
24PA0734-U	Mining – cabin
24YE0359-U	Lithic artifact scatter-prehistoric occupation – White Post
24PA0837-E	Jardine Penstock
24PA0838-U	Mining – cabin
24PA1085-U	Mining – Malin Creek Cabin
24PA1086-U	Mining – Bald Mtn. adits
24PA1109-U	Lithic artifact scatter & stone circle-prehistoric occupation
24PA1239-U	Penstock Sheep Blind-prehistoric occupation
24PA1240-U	Penstock Sheep Blind-prehistoric occupation
24PA1266-U	Mine adit – Carmel Claim (?)
24PA1267-U	Mine adit – Allison Tunnel
24PA1269-U	Mine adit – Iron King
24PA1270-U	Mine adit & cabin – Lower Bald Mt.
24PA1271-U	Mine adit
24PA1273-U	Mine adit
24PA1275-U	Mine adit
24PA1276-U	Mine adits & prospects
24PA1278-U	Mining – Pine Creek Cabin
24PA1334-U	Mine adit
24PA1335-U	Mine adit
24PA1336-U	Mining reservoir
24PA1337-U	Lithic artifact scatter & quarry-prehistoric occupation
24PA1338-U	Cabin & outhouse
24PA1340-U	Mine trenches
24PA1341-U	Mine adit
24PA1342-U	Mine adit
24PA1344-U	Mine adit – Jar 9 Claim
24PA1385-U	Mine adit – Park Line
24PA1386-U	Mine adit – Crooked Cabin
24PA1541-U	Hayes Ditch

**Two sites, the Jardine Townsite (24PA0335) and an abandoned mine adit (24PA1274), are located within the proposed Crevice withdrawal area but on private property, as such, these two sites are not included in this analysis.*

Section 4: Environmental Consequences

Minerals withdrawals are strictly administrative actions not involving any ground disturbing activities. In an effort to provide an analysis that evaluates the proposed actions' effects on the natural and physical environmental and the relationship of people within that environment (36 CFR 220.4(a)(3)) two reasonably foreseeable development (RFD) scenarios for minerals development have been created. The importance of these RFD scenarios is not the exact estimated number of future mines but rather, the relative levels of estimated activity between alternatives.

These two RFD scenarios are based on the distribution of existing claims, potential for mineral occurrence, and the likelihood of exploration or development. Areas where these items have a high potential, intersect, or overlap are identified as mineralize target areas. These mineralize target areas are the focus for determining the potential for resource effects (e.g. whether or not existing claims occur in areas with threatened, endangered, and sensitive species occurrence or habitat, wetlands, popular recreation sites, or other high-value resources). For the proposed Emigrant and Crevice withdrawal areas Figures 9 and 10 (respectively) display the identified mineralize targets used for the analyses'.

Interdisciplinary team member's analyses' have made no assumptions about the specifics (site-location, timing, nature, intensity, site-specific mitigations, project design criteria, or viable alternatives) of any future locatable minerals activities, as any such assumptions would be speculative. Regardless of alternative selected, future mineral activities would be subject to site-specific environmental analysis, as required by applicable law, regulation, and policy.

Figure 9. Identified minerals targets for the proposed Emigrant withdrawal areas used for the analyses' (facing north).

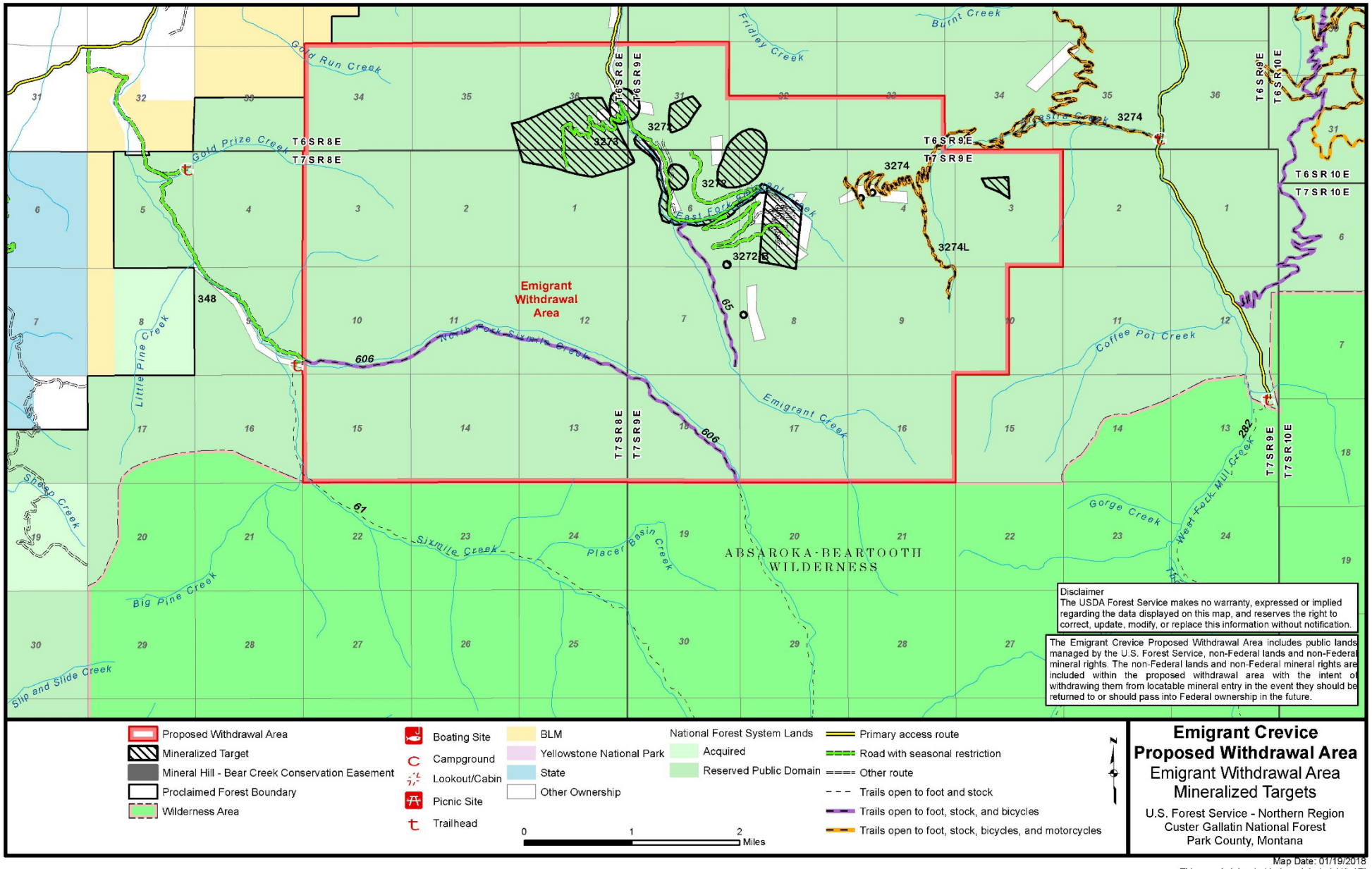
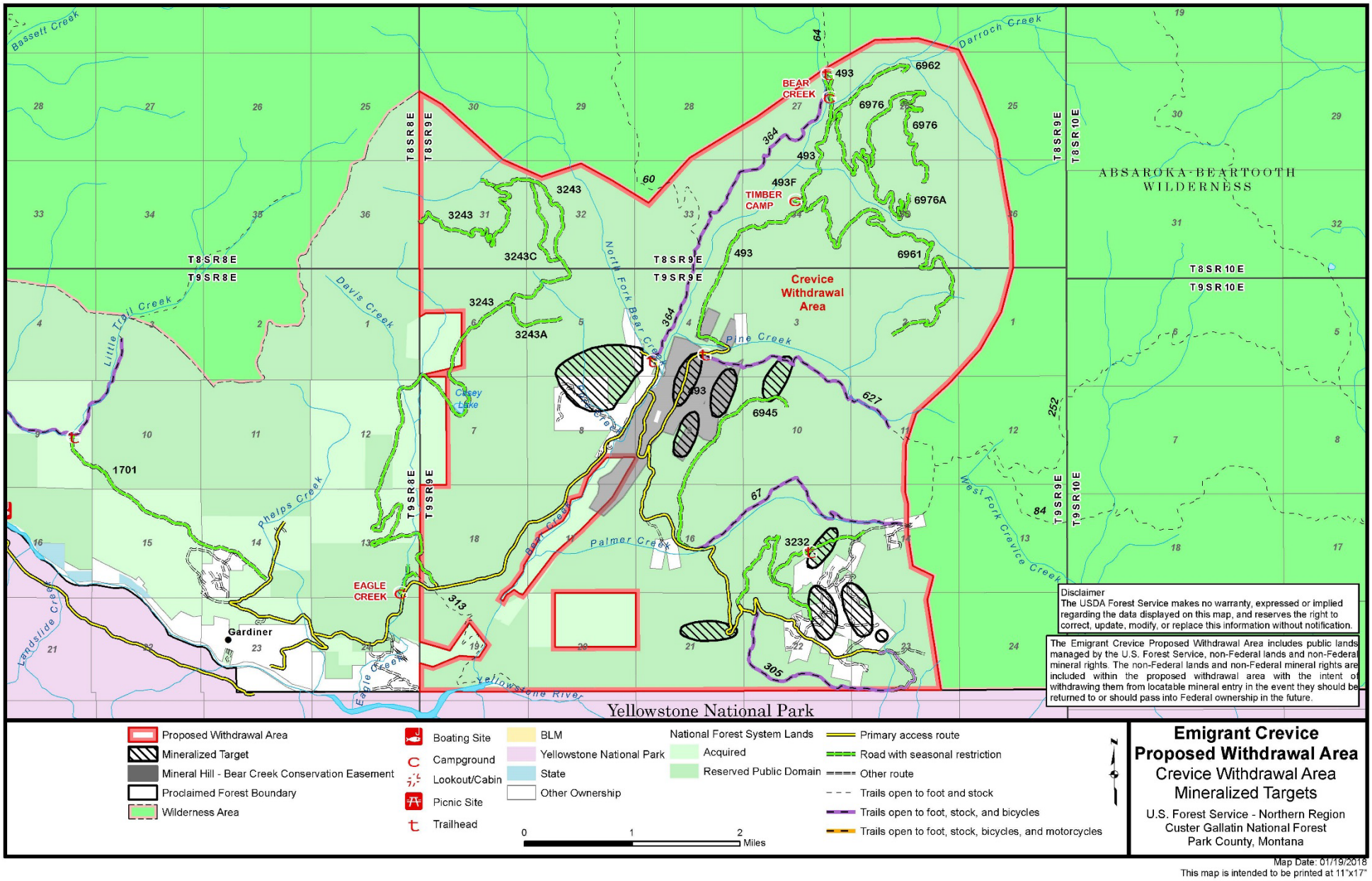


Figure 10. Identified minerals targets for the proposed Crevice withdrawal areas used for the analyses' (facing north).



Reasonable Development Scenario Alternative A
The proposed withdrawal areas would become open to mineral entry on November 22, 2018 and additional mining claims could then be located with subsequent exploration and possible development of potential mineral resources. Under the no action alternative, mineral development could take place throughout the proposed Emigrant and Crevice withdrawal areas as it has over the past century, subject to compliance with applicable laws and regulations governing mining operations. Any mineral development activities authorized in the future would be required to comply with applicable law, regulation and policy.

Emigrant
Reasonable foreseeable development for the no action alternative for the next 20 years estimates approximately 85 acres of ground disturbance[6] from locatable minerals projects in the proposed Emigrant withdrawal area that could occur on both NFS and private lands over a 20 year period and consist of (USFS draft RFD 2018):

- Up to 3 placer exploration projects with an approximate 0.5 year duration per project and total disturbance up to 7 acres.
- Up to 2 placer mining projects with an approximate 3 year duration per project and total disturbance up to 11 acres.
- Up to 7 lode exploration projects with an approximate 1 to 2 year duration per project and total disturbance up to 15 acres.
- Up to 2 small underground lode mine projects with an approximate 13 year duration per project and total disturbance up to 60 acres.
- Up to 3 total miles of new road construction.

Crevice
Reasonable foreseeable development for the no action alternative for the next 20 years estimates approximately 45 acres of ground disturbance[6] from locatable minerals projects in the proposed Crevice withdrawal area that could occur on both NFS and private lands over a 20 year period and consist of (USFS draft RFD 2018):

- Up to 1 placer exploration project with an approximate 0.5 year duration and total disturbance up to 1 acre.
- No placer mining projects.
- Up to 5 lode exploration projects with an approximate 1 to 2 year duration per project and total disturbance up to 12 acres.
- Up to 1 small underground lode mine project with an approximate 12 year duration and total disturbance up to 35 acres.
- Up to 4 total miles of new road construction.

Reasonable Development Scenario Alternative B
Under the proposed action alternative, mineral development could take place throughout the proposed Emigrant and Crevice withdrawal areas, subject to compliance with applicable laws and regulations governing mining operations. If the proposed withdrawal were in effect, there would be

[6] Total disturbance is less than straight addition of all lode/placer projects because development would occur within some of the exploration and/or road footprint.

no new mining claims staked and only the claims existing at the time of segregation would have potential for locatable minerals projects should they be determined to have valid existing rights. Any mineral development activities authorized in the future would be required to comply with applicable law, regulation and policy.

Emigrant
Reasonable foreseeable development for the next 20 years if the proposed withdrawal were in effect includes, up to approximately 47 acres of ground disturbance[6] in the proposed Emigrant area that could occur on both NFS and private lands from locatable minerals projects over a 20 year period and may consist of (USFS draft RFD 2018):

- Up to 2 placer exploration projects with an approximate 0.5 year duration per project and total disturbance up to 5 acres.
- Up to 1 placer mining project with an approximate 3 year duration and total disturbance up to 6 acres.
- Up to 3 lode exploration projects with an approximate 1 to 2 year duration per project and total disturbance up to 6 acres.
- Up to 1 small underground lode mine project with an approximate 12 year duration and total disturbance up to 35 acres.
- Up to 2.5 total miles of new road construction.

Crevice
Reasonable foreseeable development for the next 20 years if the proposed withdrawal were in effect includes, up to approximately 34 acres of ground disturbance[6] in the proposed Crevice area could occur across both NFS and private lands from locatable minerals projects over a 20 year period and may consist of (USFS draft RFD 2018):

- No placer exploration projects.
- No placer mining projects.
- Up to 3 lode exploration projects with an approximate 1 to 2 year duration per project and total disturbance up to 8 acres.
- Up to 1 small underground lode mine project with an approximate 10 year duration and total disturbance up to 30 acres.
- Up to 2 total miles of new road construction.

4.1 Mineral Resources

Emigrant

Alternative A
Direct and indirect effects of the no action alternative would allow the proposed Emigrant withdrawal area to experience ongoing mineral exploration, development, and likely future production on NFS and private lands. There would be mineral activity in the known mineralized zones in addition to those areas that are geologically favorable areas. It is predicted that many of the old placer deposits could be reworked and new placer deposits discovered as extensions of the known deposits.

The no action alternative estimates approximately 85 acres of ground disturbance from locatable

minerals projects in the proposed Emigrant withdrawal area that could occur on both NFS and private lands over a 20 year period. As per the RFD this 85 acres of disturbance could consist of three placer exploration projects, two placer mines, seven lode exploration projects, and two small underground lode mines. Up to four miles of new road construction could need to be constructed to facilitate these activities.

The no action alternative would have no effect on leasable mineral (coal, oil, gas, geothermal) or salable mineral development potential. Leasable and salable mineral development would continue to be activities that could be approved or denied at the discretion of the Forest Service. Potential for coal, oil, gas, and geothermal development would remain low.

Cumulative Effects

There are no proposed or current federal minerals leases within the proposed Emigrant withdrawal area. The RFD scenario for the no action describes activities that could take place in the next 20 years within the proposed Emigrant withdrawal area and represents the cumulative effects for minerals resources.

Alternative B

Direct and indirect effects of the proposed action alternative would ensure no new mining claims would be staked, for the 20 time year frame. For any future minerals activity the Forest Service would need to ensure that valid existing rights have been established prior to plan of operation approval. In areas that contain no active mining claims as of the segregation date, including any areas where existing mining claims are closed (abandoned, forfeited, or declared null and void) during the segregation or withdrawal period, there would be no future mining activities for the 20 year withdrawal period. However, a patented claim or unpatented claim with valid existing rights may have extra-lateral rights, which could extend the future subsurface mining activity beyond the lode claim boundaries.

The proposed action alternative estimates 45 percent less ground disturbance (47 acres) from locatable minerals projects in the proposed Emigrant withdrawal area that could occur across both NFS and private lands over a 20 year period when compared to the no action alternative. There would be 30 percent less development from placer exploration, half the amount of placer mining projects, 40 percent less disturbance from lode exploration, and half the number of small underground load mines. The amount of road miles needed for minerals exploration and development could necessitate up to 2.5 miles of road construction, 1.5 miles less than predicated with alternative A.

The no action alternative would have no effect on leasable mineral (coal, oil, gas, geothermal) or salable mineral development potential. Leasable and salable mineral development would continue to be activities that could be approved or denied at the discretion of the Forest Service. Potential for coal, oil, gas, and geothermal development would remain low.

Cumulative Effects

There are no proposed or current federal minerals leases within the proposed Emigrant withdrawal area. The RFD scenario for the proposed action describes activities that could take place in the next 20 years within the proposed Emigrant withdrawal area and represents the cumulative effects for minerals resources.

Crevice

Alternative A

Direct and indirect effects of the no action alternative would allow the proposed Crevice withdrawal

area to experience ongoing mineral exploration, development, and likely future production similar to levels over the past 20 years. Any undiscovered deposits would likely be similar to the deposit types that have been mined in this area in the past (i.e. lode gold deposit at the Mineral Hill mine). A USGS report estimated a 90 percent chance of one or more additional deposits similar to the mined Mineral Hill deposit in the Crevice-Jardine area, a five percent chance of two or more additional deposits, and a one percent chance of three or more deposits (Hammarstrom et al 1993). If market conditions become favorable for other commodities, the irregular distribution of mineralized zones with lenticular masses of extremely variable size containing silver, copper, lead, zinc, tungsten, and even arsenic (Seager 1944) could be further explored and developed in the proposed Crevice withdrawal area.

The no action alternative estimates approximately 45 acres of ground disturbance from locatable minerals projects in the proposed Crevice withdrawal area that could occur across both NFS and private lands over a 20 year period. These 45 acres of disturbance would consist of one placer exploration project, five lode exploration projects, and one small underground lode mine. Up to four miles of new road construction could need to be constructed to facilitate these activities. The RFD scenario for the no action alternative estimates zero placer mines.

The no action alternative would have no effect on leasable mineral (coal, oil, gas, geothermal) or salable mineral development potential. Potential for coal, oil, gas, and geothermal development would remain low. Leasable and salable mineral development would continue to be activities that could be approved or denied at the discretion of the Forest Service. Any future geothermal development activities in the Crevice area would be required to comply with the State of Montana's Yellowstone Controlled Groundwater Area rules.

Cumulative Effects

There are no proposed or current federal minerals leases within the proposed Crevice withdrawal area. The RFD scenario for the no action describes activities that could take place in the next 20 years within the proposed Emigrant withdrawal area and represents the cumulative effects for minerals resources.

Alternative B

Direct and indirect effects of the proposed action alternative would ensure no new mining claims would be staked, for the 20 time year frame. For any future minerals activity the Forest Service would need to ensure that valid existing rights have been established prior to plan of operations approval. In areas that contain no active mining claims as of the segregation date, including any areas where existing mining claims are closed (abandoned, forfeited, or declared null and void) during the segregation or withdrawal period, there would be no future mining activities for the 20 year withdrawal period. However, a patented claim or unpatented claim with valid existing rights may have extra-lateral rights, which could extend the future subsurface mining activity beyond the lode claim boundaries.

The proposed action alternative estimates 25 percent less ground disturbance (34 acres) from locatable minerals projects in the proposed Crevice withdrawal area that could occur across both NFS and private lands over a 20 year period. There would be zero placer exploration, zero placer mines, one-third less lode exploration projects, and one small underground mine with five acres less disturbance than alternative A. The amount of road miles needed for minerals exploration and development could necessitate up to two miles of road construction, two miles less than alternative A.

The proposed action alternative would have no effect on leasable mineral (coal, oil, gas, geothermal) or salable mineral development potential. Potential for coal, oil, gas, and geothermal development

would remain low. Leasable and salable mineral development would continue to be activities that could be approved or denied at the discretion of the Forest Service. Any future geothermal development activities in the Crevice area would be required to comply with the State of Montana's Yellowstone Controlled Groundwater Area rules.

Cumulative Effects

There are no proposed or current federal minerals leases within the proposed Emigrant withdrawal area. The RFD scenario for the proposed action describes activities that could take place in the next 20 years within the proposed Emigrant withdrawal area and represents the cumulative effects for minerals resources.

4.2 Scenic Resources

Emigrant

Alternative A

Future mining activities described in the RFD scenario have the potential to directly and indirectly affect scenic resources through ground disturbing activities such as clearing land for construction of access roads, support facilities, and staging areas. Depending upon the proposed method for mining of ore, various impacts could occur. Impacts could likely involve native vegetation removal, increased vehicle traffic and road improvements including widening and straightening of roads. Increased heights of road cuts and fills could be visible from various vantage points. Sources of emissions are common with mining operations and can include dust from mine processing, brief dust, blasting, construction activities, and roadways associated with mining activities. Structures such as offices, storage and maintenance buildings, fences, parking lots, processing facilities can all be visible from long distances and can adversely affect views and vistas. Night time lighting for safety and security emitted from overhead mine infrastructure, floodlights, and vehicle-mounted lights (e.g. haul trucks, loaders, and other heavy equipment) can be seen from great distances at night.

All of the identified mineralized targets are within areas assigned to the Modification VQO classification by the Forest Plan. The Modification VQO classification allows for activities that may visually dominate the original character of the landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional activities such as structures, roads, slash, root wads, etc., must remain visually lesser to the proposed composition. To maintain consistency with the Forest Plan any future minerals explorations or developments could require mitigations to ensure compliance with the VQO classification and the Forest Plan.

In 2017, 1.4 million vehicles traveled past the proposed Emigrant withdrawal area along Highway 89 (National Park Service 2017). Figure 11 displays the areas visible to drivers along Highway 89 within the proposed Emigrant withdrawal area. Figure 11 does not take into account vegetation screening, but does consider topography changes and elevation. Forty-six acres (0.2 percent of the proposed Emigrant withdrawal area) of mineralized target #4 would be visible from the Highway 89. These 46 acres represent 13 percent of the mineralized target area. Mineral activities at any of the mineralized target areas could be visible from within the proposed withdrawal and could have an effects on scenic integrity. Minerals activities on private lands could be visible from Highway 89 and within the proposed withdrawal area, depending on size and location. The possible four miles of new roads could affect scenic quality, depending on their location and season of use. These new roads might be visible from Highway 89 and from within the withdrawal area.

Cumulative Effects

Past exploration and development of minerals have occurred and signs of these activities are still visible in the form of changed landforms, color changes of scree slopes from manipulation with equipment, and staining of talus from mineral-laden water seeping from past mine entrances and adits. Future minerals activities could add to these visible indicators of minerals activities, but is unlikely with proper site specific mitigation they could cause a change the overall VOQ classifications for the area.

Alternative B

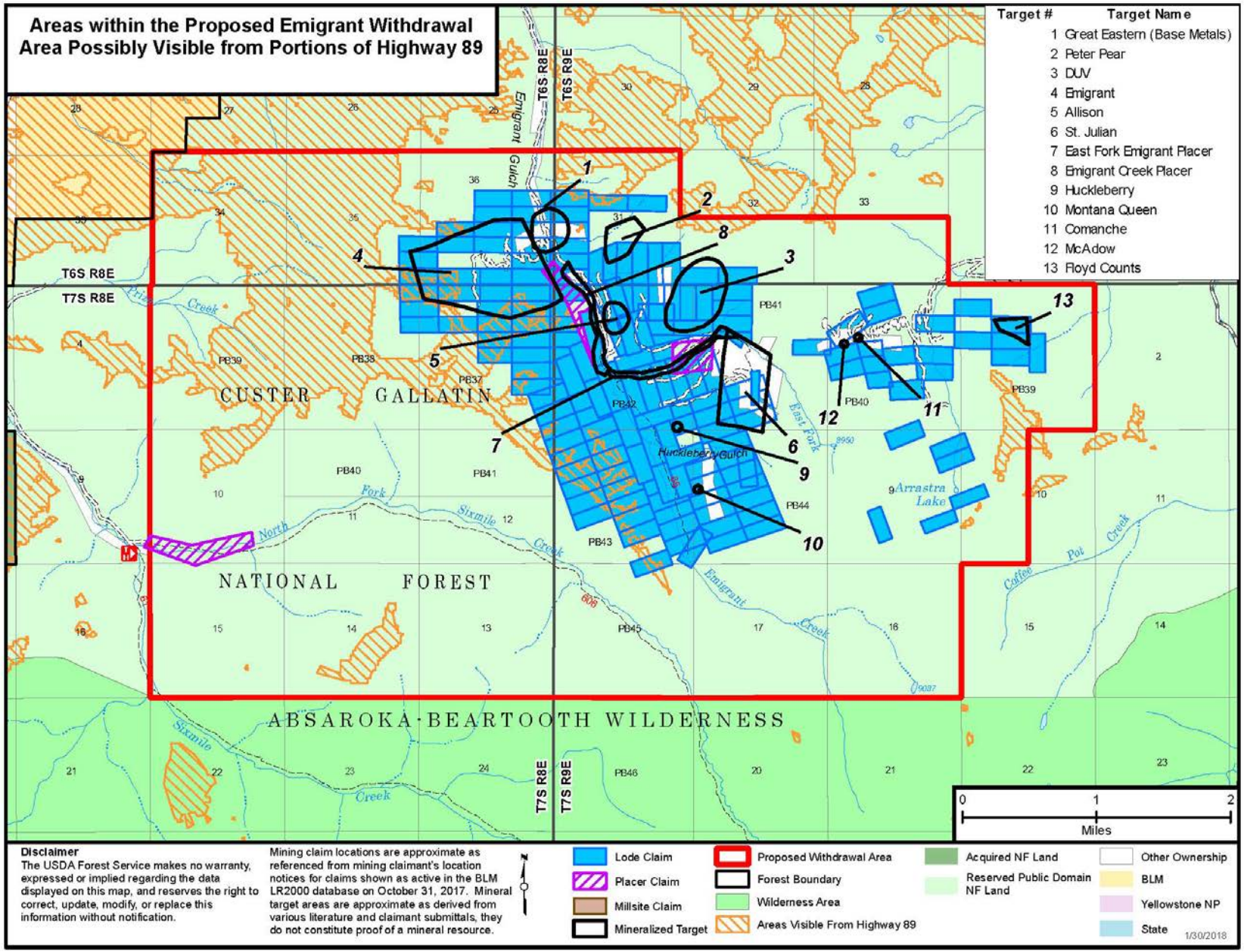
Direct and indirect effects to scenic resources would be similar to those discussed for the no action alternative. Direct and indirect effects to scenic resources decrease as disturbance acres decrease. The RFD scenario for the proposed action estimates 45 percent less disturbance, which equates to a 45 percent lessened impact potential to visual resources. There is a 45 percent less chance that mineralized target #4 would be developed, decreasing the potential that minerals activities within the proposed Emigrant withdrawal area would be visible from Highway 89. Minerals activities at any of the mineralized target areas could be visible within the proposed withdrawal area and could have an effect on scenic integrity. The possible 2.5 miles of new roads could affect scenic quality, depending on their location and season of use. These new roads might be visible from Highway 89 and from within the withdrawal area. To maintain consistency with the Forest Plan any future minerals explorations or developments could require mitigations to ensure compliance with the VQO classification and the Forest Plan.

Cumulative Effects

Cumulative effects to scenic resources would be lessened by the same magnitude (45 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Past exploration and development of minerals have occurred and signs of these activities are still visible in the form of changed landforms, color changes of scree slopes from manipulation with equipment, and staining of talus from mineral-laden water seeping from past mine entrances and adits. Future minerals activities could add to these visible indicators of minerals activities, but is unlikely with proper site specific mitigation they would cause a change the overall VOQ classifications for the area.

Figure 11. Areas within the proposed Emigrant withdrawal area that are visible from Highway 89 and minerals targets that have a likelihood of exploration or mineral development (facing north).



Crevice

Alternative A

Future mining activities described in the RFD scenario for the no action alternative have the potential to directly and indirectly affect scenic resources through ground disturbing activities such as clearing land for construction of access roads, support facilities, and staging areas. Depending upon the proposed method for mining of ore, various impacts could occur. Impacts could likely involve native vegetation removal, increased vehicle traffic and road improvements including widening and straightening of roads. Increased heights of road cuts and fills could be visible from various vantage points. Sources of emissions are common with mining operations and can include dust from mine processing, brief dust, blasting, construction activities, and roadways associated with mining activities. Structures such as offices, storage and maintenance buildings, fences, parking lots, processing facilities can all be visible from long distances and can adversely affect views and vistas. Night time lighting for safety and security emitted from overhead mine infrastructure, floodlights, and vehicle-mounted lights (e.g. haul trucks, loaders, and other heavy equipment) can be seen from great distances at night.

The identified mineralized targets are within areas either classified as Modification or Partial Retention VQO by the Forest Plan. The Forest Plan direction for the mineralized target areas within the Modification classification would allow for activities that may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional activities such as structures, roads, slash, root wads, etc., must remain visually lesser to the proposed composition. The Forest Plan direction for mineralized target areas within the 'Partial Retention' classification would allow management activities that remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., must remain visually subordinate to the characteristic landscape. Activities may introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape. To maintain consistency with the Forest Plan any future minerals explorations or developments could require mitigations to ensure compliance with these VQO classifications and the Forest Plan.

A daily average of 4,350 vehicles (National Park Service 2016) traveled past the proposed Crevice withdrawal area along the Mammoth to Roosevelt Road (Highway 89) within Yellowstone National Park. Park visitors have direct views of the area for 1.5 miles of roadway and the proposed withdrawal area is visible from the popular Blacktail Plateau and Blacktail ponds area. Figure 12 displays the areas visible to visitors within Yellowstone National Park. Figure 12 does not take into account vegetation screening, but does consider topography changes and elevation. Approximately 206 acres (1.5 percent of the proposed Crevice withdrawal area) of the identified mineralized target areas would be visible from within Yellowstone National Park. These 206 acres represent 33 percent of the mineralized target areas. Mineral activities at any of the mineralized target areas could be visible, for certain areas, within the proposed withdrawal and could have an effects on scenic integrity. Depending on activity type, size and location minerals activities on private lands could be visible from within Yellowstone National Park and within the proposed withdrawal area. The possible four miles of new roads could affect scenic quality, depending their location and season of use. These new roads might be visible from Yellowstone National Park and from within the withdrawal area.

Cumulative Effects

Past exploration and development of minerals have occurred and signs of these activities are still visible in the form of changed landforms, color changes of scree slopes from manipulation with

equipment, and staining of talus from mineral-laden water seeping from past mine entrances and adits. Future minerals activities could add to these visible indicators of minerals activities, but is unlikely with proper site specific mitigation they would cause a change the overall VOQ classifications for the area.

Alternative B

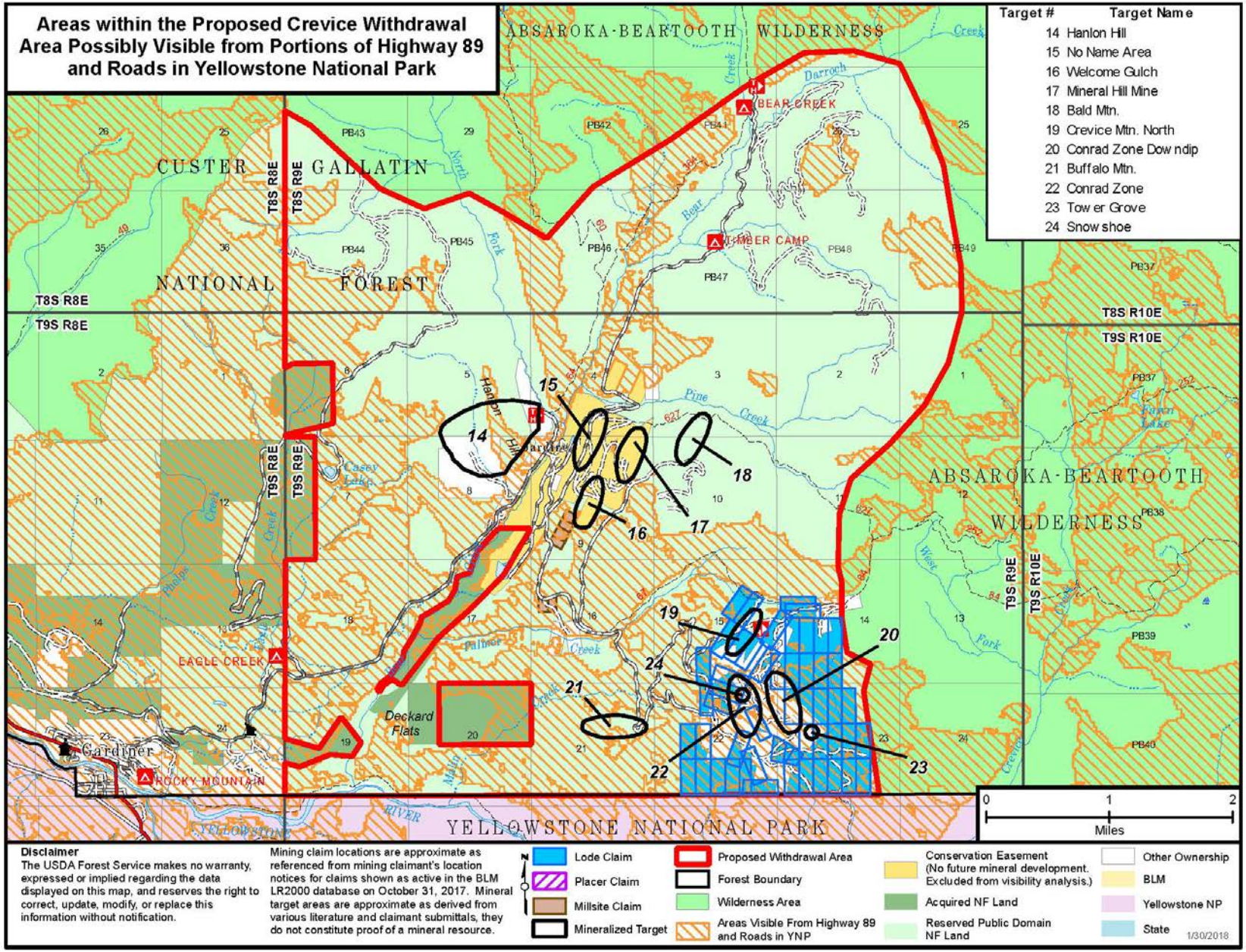
Direct and indirect effects to scenic resources would be similar to those discussed for the no action alternative. Direct and indirect effects to scenic resources decrease as disturbance acres decrease. The RFD scenario for the proposed action estimates 25 percent less disturbance, which equates to a 25 percent lessened impact potential, to visual resources. There is a 25 percent less chance that any mineralized target would be developed, decreasing the potential that development within the proposed Crevice withdrawal area would be visible from within Yellowstone National Park. Minerals activities at any of the mineralized target areas could be visible from within the proposed withdrawal area and could have an effect on scenic integrity. There would be no visible impacts from placer mining or exploration with the proposed action. The possible two miles of new road could affect scenic quality and be visible from Yellowstone National Park, depending on their location and season of use. To maintain consistency with the Forest Plan any future minerals explorations or developments could require mitigations to ensure compliance with these VQO classifications and the Forest Plan.

Cumulative Effects

Cumulative effects to scenic resources would be lessened by the same magnitude (25 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Past exploration and development of minerals have occurred and signs of these activities are still visible in the form of changed landforms, color changes of scree slopes from manipulation with equipment, and staining of talus from mineral-laden water seeping from past mine entrances and adits. Future minerals activities could add to these visible indicators of minerals activities, but is unlikely, with proper site specific mitigation change the overall VOQ classifications for the area. Minerals activities on private lands could cumulative impact scenic resources.

Figure 12. Areas within the proposed Crevice withdrawal area that are visible from within Yellowstone National Park and minerals targets that have a likelihood of exploration or mineral development (facing north).



4.3 Recreation Resources

Emigrant

Alternative A

Direct effects on overall recreation uses from the no action alternative are unlikely to produce a measurable change in uses such as hiking, hunting, OHV/4WD travel, camping, mountaineering, horseback riding, backcountry skiing, snowshoeing, and snowmobiling. Alternative A could indirectly affect future trends in dispersed recreation activities, since the entire area is open to dispersed camping. As new mineral activities occur campers may be displaced or have a lower quality experience due to noise, equipment activity, and dust. The presence of work trucks, additional people in the area, helicopter overflights, staging of mining equipment, or an increased frequency of traffic may discourage road use. There are no developed recreation sites in the proposed Emigrant withdrawal area, therefore there would be no effect to developed recreation.

There are approximately 13 miles of roads and approximately 7 miles of trails within the withdrawal area. As minerals activities are approved and implemented it is not likely that current non-motorized trails would be used for access to work sites. Effects on these developed trails would be minimal due to the small amount (0.03 miles) of overlap between Emigrant Creek Trail and mineralized target #7. Approximately 25 percent of the current roads (3.3 miles) overlap with mineralized target areas. Motorized trails Arrastra Creek and Arrastra Lake routes could potentially be used for mineral project access. Recreation access along roads and routes to trailheads could be delayed or restricted during work periods for road maintenance or construction associated with minerals activities. The presence of trucks and other equipment on existing or new (up to 4 miles) routes may discourage users from utilizing the main access routes and trailheads.

The no action alternative would not change current permitted uses by outfitters and guides. Permit users could be displaced to other areas inside or outside the proposed Emigrant withdrawal area, but that potential displacement would depend upon timing, intensity, location, and other site specific details. MFWP would continue to offer hunting opportunities in this area as part of their management of big game.

Since any future mineral projects would likely require motorized equipment and vehicles to enter exploration and extraction areas, possible effects to ROS could be expected during the summer when the proposed Emigrant withdrawal area is accessible by motorized vehicles. The settings potentially affected would be Rural and Semi Primitive Non-Motorized. Visitor experiences in the Semi Primitive Motorized (60 percent of the proposed withdrawal area) ROS could be altered in the event of an authorized plan of operations in the area. To maintain consistency with the Forest Plan any future minerals explorations or developments could need mitigations if the ROS classifications were likely to be altered.

The proposed Emigrant withdrawal area does not include any designated Wilderness or RNAs, and therefore the no action alternative would not have a direct effect on lands with these designations.

The proposed Emigrant withdrawal areas contains lands within two designated IRAs; North Absaroka (7,407 acres) and Chico Peak (614 acres). The RFD scenario for the no action estimated four miles of new road could need to be constructed to access or develop minerals resources at the mineralized target areas. Lands with IRA designations could be affected by future mineral entry if new roads were authorized for construction and access to work sites. Reasonable access for the exploration of locatable minerals, or development of valid claims would be allowed pursuant to the General Mining Law of 1872, and are not prohibited by the 2001 Roadless Rule. Determination of access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

Cumulative Effects

Past mining activity (older than 50 years) has had an increased effect on recreational use due to interest in the historic Emigrant mining district. Increases in minerals activities have the potential to cumulatively effect overall trends in recreation use within the proposed Emigrant withdrawal area. The roads and remaining structures of the Emigrant mining district draw visitors and facilitate travel for diverse recreationists, including hikers, mountain bikers, horse riders, OHV and motorcycle enthusiasts. Past actions which may have affected recreation uses include livestock grazing, fire restoration, and road maintenance, but most of these, with the exception of livestock grazing, have facilitated recreation use rather than limit it. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Future minerals activities in the RFD scenario combined with the proximity of the proposed Emigrant withdrawal area to the Absaroka – Beartooth Wilderness could have a cumulative effects on the character for which those were designed a Wilderness.

Alternative B

Direct and indirect effects to recreation uses (dispersed camping, roads, trails, permitted uses) would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 45 percent. The proposed action RFD estimates 45 percent less acreage of disturbance (47 acres), as compared to the no action alternative (85 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities would displace or directly affect recreation users and permit holders. MFWP would continue to offer hunting opportunities in this area as part of their management of big game.

Since the proposed action alternative still has the possibility of future mineral activities that would likely require motorized equipment and vehicles there could still be possible effects to ROS during the summer. The settings potentially affected would be the Rural and Semi Primitive Non-Motorized. These effects would be lessened by 45 percent because of the overall decrease in minerals activities. To maintain consistency with the Forest Plan and future minerals explorations or developments could need mitigations if the ROS classifications were likely to be altered.

The proposed Emigrant withdrawal area does not include any designated Wilderness or RNAs, and therefore the proposed action alternative would not have a direct effect on lands with these designations.

The proposed Emigrant withdrawal areas contains lands within two designated IRAs; North Absaroka (7,407 acres) and Chico Peak (614 acres). The RFD scenario for the proposed action estimated 2.5 miles of new road could need to be constructed to access or develop minerals resources at the mineralized target areas. Lands with IRA designations could be affected by future mineral entry if new roads were authorized for construction and access to work sites. Reasonable access for the exploration of locatable minerals, or development of valid claims would be allowed pursuant to the General Mining Law of 1872, and are not prohibited by the 2001 Roadless Rule. Determination of reasonable access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

Cumulative Effects

Past mining activity (older than 50 years) has had an increased effect on recreational use due to interest in the historic Emigrant mining district. Increases in minerals activities have the potential to cumulatively effect overall trends in recreation use within the proposed Emigrant withdrawal area. The roads and remaining structures of the Emigrant mining district draw visitors and facilitate travel for diverse recreationists, including hikers, mountain bikers, horse riders, OHV and motorcycle enthusiasts. Past actions which may have affected recreation uses include livestock grazing, fire

restoration, and road maintenance, but most of these, with the exception of livestock grazing, have facilitated recreation use rather than limit it.

Cumulative effects to recreation uses, IRAs, and wilderness would be lessened by the same magnitude (45 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Crevice

Alternative A

Direct effects on overall recreation uses from the no action alternative are unlikely to produce a measurable change in uses such as hiking, hunting, OHV/4WD travel, camping, mountaineering, horseback riding, backcountry skiing, snowshoeing, and snowmobiling. Alternative A could indirectly affect future trends in dispersed recreation activities, since the entire area is open to dispersed camping. As new mineral activities occur campers may be displaced or have a lower quality experience due to noise, equipment activity, and dust. The presence of work trucks, additional people in the area, helicopter overflights, staging of mining equipment, or an increased frequency of traffic may discourage road use.

There are two developed recreation sites (Bear Creek and Timber Camp Campgrounds) within the proposed Crevice withdrawal area that could be adversely effected by future minerals activities at the mineralized targets due to current road access to mineralized target areas and the camping areas.

There are approximately 36 miles of roads, 15 miles of trails and five trailheads within the proposed Crevice withdrawal area. As minerals activities are approved and implemented it is not likely that current non-motorized trails would be used for access to work sites. Effects on these developed trails would be minimal due to the small amount (0.13 miles) of overlap on Pine Creek, Palmer Creek, Main Bear Creek, and Crevice Creek trails. Less than two percent of the current roads (0.6 miles) overlap with mineralized target areas. Recreation access along roads and routes to trailheads could be delayed or restricted during work periods for road maintenance or construction associated with minerals activities. The presence of trucks and other equipment on existing or new (four miles) routes may discourage users from utilizing the main access routes and trailheads.

The no action alternative would not change current permitted uses by outfitters and guides. Permit users could be displaced to other areas inside or outside the proposed Crevice withdrawal area, but that potential displacement would depend upon timing, intensity, location, and other site specific details. MFWP would continue to offer hunting opportunities in this area as part of their management of big game in the future.

Since any future mineral projects would likely require motorized equipment and vehicles to enter exploration and extraction areas, possible effects to ROS could be expected during the summer when the proposed Crevice withdrawal area is accessible by motorized vehicles. The settings potentially affected would be the Rural and Semi Primitive Non-Motorized. Visitor experiences in the Semi Primitive Motorized (10 percent of the proposed withdrawal area) ROS could be altered in the event of an authorized plan of operations in the area. To maintain consistency with the Forest Plan and future minerals explorations or developments could need mitigations if the ROS classifications were likely to be altered.

The proposed Crevice withdrawal area does not include any designated Wilderness or RNAs, and therefore the no action alternative would not have a direct effect on lands with these designations.

The proposed Crevice withdrawal areas contains 6,212 acres within the North Absaroka IRA. The

RFD scenario for the no action estimated four miles of new road could need to be constructed to access or develop minerals resources at the mineralized target areas. Lands within the North Abaroka IRA could be affected by future mineral entry if new roads were authorized for construction and access to work sites. Reasonable access for the exploration of locatable minerals, or development of valid claims would be allowed pursuant to the General Mining Law of 1872, and are not prohibited by the 2001 Roadless Rule. Determination of reasonable access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

Cumulative Effects

Past mining activity (older than 50 years) has had an increased effect on recreational use due to interest in the historic Jardine/Crevice mining districts. Increases in minerals activities have the potential to cumulatively effect overall trends in recreation use within the proposed Crevice withdrawal area. The roads and remaining structures of the Crevice mining district draw visitors and facilitate travel for diverse recreationists, including hikers, mountain bikers, horse riders, OHV and motorcycle enthusiasts. Past actions which may have affected recreation uses include livestock grazing, fire restoration, and road maintenance, but most of these, with the exception of livestock grazing, have facilitated recreation use rather than limit it. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Future minerals activities in the RFD scenario combined with the proximity of the proposed Crevice withdrawal area to the Absaroka – Beartooth Wilderness could have a cumulative effects on the character for which those were designed a Wilderness.

Alternative B

Direct and indirect effects to recreation uses (dispersed camping, roads, trails, permitted uses) would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 25 percent. The proposed action RFD estimates 25 percent less acreage of disturbance (34 acres), as compared to the no action alternative (45 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities would displace or directly affect recreation users. MFWP would continue to offer hunting opportunities in this area as part of their management of big game in the future.

Since the proposed action alternative still has the possibility future mineral activities that would likely require motorized equipment and vehicles there would still be possible effects to ROS during the summer. The settings potentially affected would be the Rural and Semi Primitive Non-Motorized. These effects would be lessened by 25 percent because of the overall decrease in minerals activities. To maintain consistency with the Forest Plan and future minerals explorations or developments could need mitigations if the ROS classifications were likely to be altered.

The proposed Crevice withdrawal area does not include any designated Wilderness or RNAs, and therefore the proposed action alternative would not have a direct effect on lands with these designations.

The proposed Crevice withdrawal areas contains 6,212 acres within the North Absaroka IRA. The RFD scenario for the proposed action estimated two miles of new road could need to be constructed to access or develop minerals resources at the mineralized target areas. This is an increase of 0.5 miles of roads from the no action alternative. Lands within the North Absaroka IRA could be affected by future mineral entry if new roads were authorized for construction and access to work sites. Reasonable access for the exploration of locatable minerals, or development of valid claims would be allowed pursuant to the General Mining Law of 1872, and are not prohibited by the 2001 Roadless Rule. Determination of reasonable access requirements for exploration or development of locatable minerals is governed by the provisions of 36 CFR part 228.

Cumulative Effects

Past mining activity (older than 50 years) has had an increased effect on recreational use due to interest in the historic Jardine/Crevice mining districts. Increases in minerals activities have the potential to cumulatively effect overall trends in recreation use within the proposed Crevice withdrawal area. The roads and remaining structures of the Crevice mining district draw visitors and facilitate travel for diverse recreationists, including hikers, mountain bikers, horse riders, OHV and motorcycle enthusiasts. Past actions which may have affected recreation uses include livestock grazing, fire restoration, and road maintenance, but most of these, with the exception of livestock grazing, have actually facilitated recreation use rather than limit it.

Cumulative effects to recreation uses, IRAs, and wilderness would be lessened by the same magnitude (25 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

4.4 Terrestrial (Wildlife) Species

Emigrant

Alternative A

Direct and indirect impacts to wildlife species could result from habitat alteration and fragmentation, wildlife vehicle collision, temporary displacement from helicopter overflights, temporary or long-term displacement from potential mineral exploration development and reclamation activities. Impacts to wildlife habitat include direct impacts related to acres disturbed at drill pads, mine openings, waste rock piles placer areas, equipment staging areas, roads, associated infrastructure, plus a buffer around road corridors to account for the indirect impacts associated with roadway noise, air, and visual disturbances that could adversely affect wildlife behavior. Indirect effects on wildlife include displacement caused by noise, dust, and light impacts resulting from mining and transportation. All wildlife move across the landscape to varying extents. Large game roam over vast expanses that can encompass thousands of acres, while smaller species engage in essential movements on a much smaller scale. Wildlife movement can be daily or seasonal. Maintaining connectivity is important for individual movement for needed resources (food, water, etc.), immigration, emigration, and re-colonization, gene flow, seasonal migration and the ability for population movement in response to environmental changes such as fire. Connectivity can be fragmented by minerals activities such as roads, or motorized trails, mill sites, drill pads, equipment staging areas, and blasting zones.

The mineralized target areas overlap with 810 acres (5 percent) of the proposed areas' designated critical lynx's habitat. Given the no action RFD scenario, up to 85 acres of those 810 acres could be disturbed. This could likely lead to a May Affect determination for ESA species designed critical habitat. If future proposed minerals activities were to be considered and authorized, ESA consultation with USFWS could be required and mitigation measures could be necessary, given site specific conditions.

The mineralized target areas overlap with 5 acres (0.05 percent) of elk security and 115 acres (less than one percent) of grizzly bear secure areas within the proposed Emigrant withdrawal area. One hundred and ninety-seven acres (13 percent) of potential bison habitat overlaps with the mineralized target areas and all of the mineralized target areas overlap with suitable wolverine habitat. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive, MIS, and special interest species, a determination of *May Impact Individuals or Habitat* (*MIIH*) could be given. Implementation of mitigation measures could lessen impacts.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on wildlife species known or suspected within the proposed withdrawal area. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B

Direct and indirect effects to wildlife species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 45 percent. The proposed action RFD estimates 45 percent less acreage of disturbance (47 acres), as compared to the no action alternative (85 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could displace or directly affect wildlife species.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with the 810 acres (five percent) of the proposed areas designated critical lynx's habitat. Given the proposed actions RFD scenario up to 47 acres of those 810 acres could be developed. This could likely lead to a May Affect determination for ESA species designed critical habitat. If future proposed minerals activities were to be considered and approved ESA consultation with USFWS could be required, and mitigation measures could be necessary given site specific conditions.

The mineralized target areas only overlap with 5 acres (0.05 percent) of elk security and 115 acres of grizzly bear secure acres (less than one percent) within the proposed Emigrant withdrawal area. One hundred and ninety-seven acres (13 percent) of potential bison habitat overlaps with the mineralized target areas and all of the mineralized target areas overlap with suitable wolverine habitat. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive, MIS, and special interest species, a determination of *May Impact Individuals or Habitat* (*MIIH*) could be given. Implementation of mitigation measures could lessen impacts.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on wildlife species known or suspected within the proposed withdrawal area. Cumulative effects to wildlife species would be lessened by the same magnitude (45 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Section 7 of the Endangered Species Act Determination

Neither the no action nor the proposed action authorize any ground disturbing activities and therefore, both alternatives will have *no effect* on lynx, *no effect* on lynx designated critical habitats and are *not likely* to jeopardize the continued existence of wolverines.

Crevice

Alternative A

Direct and indirect impacts to wildlife species could result from habitat alteration and fragmentation, wildlife vehicle collision, temporary displacement from helicopter overflights, temporary or long-term displacement from potential mineral exploration development and reclamation activities. Impacts to wildlife habitat include direct impacts related to acres disturbed at drill pads, mine openings, waste rock piles, equipment staging areas, roads, associated infrastructure, plus a buffer around road corridors to account for the indirect impacts associated with roadway noise, air, and

visual disturbances that could adversely affect wildlife behavior. Indirect effects on wildlife include displacement caused by noise, dust, and light impacts resulting from mining and transportation. All wildlife move across the landscape to varying extents. Large game roam over vast expanses that can encompass thousands of acres, while smaller species engage in essential movements on a much smaller scale. Wildlife movement can be daily or seasonal. Maintaining connectivity is important for individual movement for needed resources (food, water, etc.), immigration, emigration, and re-colonization, gene flow, seasonal migration and the ability for population movement in response to environmental changes such as fire. Connectivity can be fragmented by minerals activities such as roads, or motorized trails, mill sites, drill pads, equipment staging areas, and blasting zones.

The mineralized target areas overlap with 494 acres (four percent) of the proposed areas designated critical lynx's habitat. Given the no action RFD scenario, up to 45 acres of those 494 acres could be disturbed. This could likely lead to a *May Affect* determination for ESA species designed critical habitat. If future proposed minerals activities were to be considered and approved, ESA consultation with USFWS could be required and mitigation measures could be necessary, given site specific conditions.

The mineralized target areas only overlap with 172 acres (three percent) of grizzly bear secure area and 171 acres (four percent) of potential bison habitat within the proposed Crevice withdrawal area. The mineralized target areas do not overlap with any elk security acres. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive, MIS, and special interest species, a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen impacts.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on wildlife species known or suspected within the proposed withdrawal area. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B

Direct and indirect effects to wildlife species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 25 percent. The proposed action RFD estimates 25 percent less acreage of disturbance (34 acres), as compared to the no action alternative (45 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could displace or directly affect wildlife species.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with the 494 acres (four percent) of the proposed areas designated critical lynx's habitat. Given the proposed actions RFD scenario up to 34 acres of those 494 acres could be developed. This could likely lead to a *May Affect* determination for ESA species designed critical habitat. If future proposed minerals activities were to be considered and approved ESA consultation with USFWS could be required, and mitigation measures could be necessary given site specific conditions.

The mineralized target areas only overlap with 172 acres (three percent) of grizzly bear and 171 (four percent) of potential bison habitat within the proposed Crevice withdrawal area. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive, MIS, and special interest species, a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen impacts.

Cumulative Effects
Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on wildlife species known or suspected within the proposed withdrawal area. Cumulative effects to wildlife species would be lessened by the same magnitude (25 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Section 7 of the Endangered Species Act Determination
Neither the no action nor the proposed action authorize any ground disturbing activities and therefore, both alternatives will have *no effect* on lynx, *no effect* on lynx designated critical habitats and are *not likely* to jeopardize the continued existence of wolverines.

4.5 Botanical Species

Emigrant

Alternative A
Habitat effects from locatable minerals activities described in the no action alternative RFD scenario could include removal of removal of vegetation and disturbance to soils or substrates in aquatic, riparian, and upland habitats. Such disturbance can cause direct mortality to individuals and impacts to populations. Habitat modification includes habitat loss, fragmentation, seed dispersal movement barriers. Indirect effects to Forest Service sensitive plants may occur through the degradation of suitable habitat due to weed expansion.

The mineralized target areas only overlap with 125 acres (less than five percent) of known whitebark pine stands and 7 acres of potential shoshonea (3.5 percent) of acres within the proposed Emigrant withdrawal area. None of the known acres of Austin's knotweed acres (30 acres) overlap with any of the mineralized target areas. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen the impacts.

There is a direct correlation of disturbed acres to the threat and spread of invasive species. The no action RFD scenario estimates 85 acres of ground disturbance, including up to four miles of roads. These 85 acres would be highly susceptible to invasive weeds. The addition of up to four miles of roads would provide vectors for weed seed transport to locations that may currently have little, or no invasive species present. Movement of equipment from sites to site, or from off-site could introduce new species and increase the spread of invasive species that can out compete sensitive and native botanical species.

Cumulative Effects
Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive botanical species known or suspected within the proposed withdrawal area, as well as increase the potential threat and spread of invasive species. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B
Direct and indirect effects to botanical species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 45 percent. The proposed action RFD estimates 45 percent less acreage of disturbance (47 acres), as compared to the no action alternative

(85 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could displace or directly affect botanical species.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with 125 acres (less than five percent) of known whitebark pine stands and 7 acres of potential shoshonea (3.5 percent) of acres within the proposed Emigrant withdrawal area. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen this determination.

Based on the direct correlation of disturbed acres to the threat and spread of invasive species, the proposed action would have 45 percent less opportunity for invasive botanical species to take root on disturbed acres. The proposed action RFD scenario estimates 2.5 miles of new roads, 1.5 miles less than the no action alternative. These roads could provide vectors for weed seed transport to locations that currently have little, or no invasive species present. Movement of equipment from sites to site, or from off-site could introduce new species and increase the spread of invasive species that can out compete sensitive and native botanical species.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive botanical species known or suspected within the proposed withdrawal area, as well as increase the potential threat and spread of invasive species. Cumulative effects to botanical species would be lessened by the same magnitude (45 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Section 7 of the Endangered Species Act Determination

There are no ESA botanical species known or suspected to occurrence within the proposed Emigrant withdrawal area, therefore, no determination is required.

Crevice

Alternative A

Habitat effects from locatable minerals activities described in the no action alternative RFD scenario could include removal of vegetation and disturbance to soils or substrates in aquatic, riparian, and upland habitats. Such disturbance can cause direct mortality to individuals and impacts to populations. Habitat modification includes habitat loss, fragmentation, seed dispersal movement barriers. Indirect effects to Forest Service sensitive plants may occur through the degradation of suitable habitat due to weed expansion.

The mineralized target areas only overlap with 1.5 acres (less than one percent) of known whitebark pine. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of May Impact Individuals or Habitat (MIIH) could be given. Implementation of mitigation measures could lessen the impacts. The mineralized target areas do not overlap with any potential shoshoenea habitat or any known locations of Austin's knotweed.

There is a direct correlation of disturbed acres to the threat and spread of invasive species. The no action RFD scenario estimates 45 acres of ground disturbance, including up to four miles of roads. These 45 acres would be highly susceptible to invasive weeds. The addition of up to four miles of roads would provide vectors for weed seed transport to locations that may currently have little, or no

invasive species present. Movement of equipment from sites to site, or from off-site could introduce new species and increase the spread of invasive species that can out compete sensitive and native botanical species.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive botanical species known or suspected within the proposed withdrawal area, as well as increase the potential threat and spread of invasive species. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B

Direct and indirect effects to botanical species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 25 percent. The proposed action RFD estimates 25 percent less acreage of disturbance (34 acres), as compared to the no action alternative (45 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could displace or directly affect botanical species.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with 1.5 acres (less than one percent) of known whitebark pine stands. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen this determination.

Based on the direct correlation of disturbed acres to the threat and spread of invasive species, the proposed action would have 25 percent less opportunity for invasive botanical species to take root on disturbed acres. The proposed action RFD has an estimated two miles (two mile decrease) of roads. These roads could provide vectors for weed seed transport to locations that currently have little, or no invasive species present. Movement of equipment from sites to site, or from off-site could introduce new species and increase the spread of invasive species that can out compete sensitive and native botanical species.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive botanical species known or suspected within the proposed withdrawal area, as well as increase the potential threat and spread of invasive species. Cumulative effects to botanical species would be lessened by the same magnitude (25 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Section 7 of the Endangered Species Act Determination

There are no ESA botanical species known or suspected to occurrence within the proposed Crevice withdrawal area, therefore, no determination is required.

4.6 Hydrology

Emigrant

Alternative A

Mining activities described in the RFD scenario for the no action alternative are anticipated to have some of the following direct and indirect effects to hydrological components. Surface water can be

intercepted during placer mining or exploratory drilling for wash plants or lubricating drill holes, and create voids that affect groundwater flow patterns. Lode mining activities may reduce surface water by required pumping of mine workings. This can result in water being transferred from underground to other locations for use or disposal. These activities may dewater stream channels adversely effecting of aquatic habitat and biota. Mining activities can generate excess water that may need to be actively treated to meet applicable Federal and State of Montana water quality standards. Any future minerals activities would be required to comply with the Federal Clean Water Act and the State of Montana Water Quality Act.

Destabilization of stream channels can effect water quality and aquatic habitat due to the increased sediment erosion of stream banks and beds. Placer mining involves the excavation, processing, and re-grading of streambed material. These activities have the potential to effect stream channel and bank stability (Harvey and Lisle 1998; Horizon Water and Environment LLC 2009). Deposition of fine sediment downstream from placer mining has been shown to negatively impact aquatic habitat and reduce aquatic macroinvertebrate densities (Weber 1986). Sediment deposition decreases aquatic habitat diversity, degrades fish spawning and rearing habitat, and reduces survival of fish eggs and fry (Bjornn and Reiser 1991; Shepard et al 1984).

Lode mining in a riparian area has the potential to remove trees that are providing stream shade and alter stream geomorphology and have the potential to effect stream temperatures. Larger placer operations can impact riparian vegetation and have the potential to effect stream temperatures by reducing shade on the stream.

Hard rock mining also has the potential to negatively affect groundwater quality by mixing waters between aquifers and introducing contaminants into groundwater systems. Mining related activities can also result in changes in pH and salt concentrations in surface and ground waters. Acid rock drainage may occur when mining or milling processes expose sulfide ores to the atmosphere. In addition, waste rock and tailings from mines can be a source of nitrogen (a residue of blasting operation) to groundwater and/or nearby surface water. Fuel and lubricants associated with suction dredges is a contaminant if they enter a live stream.

Within the proposed Emigrant withdrawal area there are 30 miles of linear streams and 3.1 of those miles (10.3 percent) overlap with mineralized target areas. Due to the natural flow of water, areas downstream and at lower elevation would be susceptible to indirect effects of minerals activities that directly effects the 3.1 miles of steam. Surface and groundwater impacts can often be mitigated through the use of effective use of best management practices and site specific mitigation measures.

EO 11990 Protection of Wetlands requires protection of the 26.7 acres of wetlands within the proposed Emigrant withdrawal area, and if possible, and practicable, full avoidance of adverse impacts to wetlands and their preservation.

The proposed Emigrant withdrawal area does not include any designated floodplains, and therefore the no action alternative will not have a direct or indirect effect on floodplains (EO 11988).

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects to hydrological components within the proposed withdrawal area. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B

Direct and indirect effects to aquatic species would be similar to those discussed for the no action

alternative. However, the overall effects would be lessened by 45 percent. The proposed action RFD estimates 45 percent less acreage of disturbance (47 acres), as compared to the no action alternative (85 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could directly or indirectly affect hydrological components.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with the 3.1 stream miles (10.3 percent). Due to the natural flow of water, areas downstream and at lower elevation would be susceptible to indirect effects of minerals activities that directly effects the 3.1 miles of steam. Surface and groundwater impacts can often be mitigated through the use of effective use of best management practices and site specific mitigation measures.

EO 11990 Protection of Wetlands requires protection of the 26.7 acres of wetlands within the proposed Emigrant withdrawal area, and if possible, and practicable, full avoidance of adverse impacts to wetlands and their preservation. Because there would be 45 percent less acres disturbed under the proposed action, there would be a 45 percent less chance that future minerals activities would take place near the 26.7 acre of wetlands.

The proposed Emigrant withdrawal area does not include any designated floodplains, and therefore the proposed action alternative will not have a direct or indirect effect on floodplains (EO 11988).

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects to hydrological components within the proposed withdrawal area. Cumulative effects to hydrological components would be lessened by the same magnitude (45 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Crevice

Alternative A

Mining activities described in the RFD scenario for the no action alternative are anticipated to have some of the following direct and indirect effects to hydrological components. Lode mining activities may reduce surface water by require pumping of mine workings. This can result in water being transferred from underground to other locations for use or disposal. These activities may dewater stream channels adversely effecting of aquatic habitat and biota. Mining activities can generate excess water that may need to be actively treated to meet applicable Federal and State of Montana water quality standards. Any future minerals activities would be required to comply with the Federal Clean Water Act and the State of Montana Water Quality Act.

Destabilization of stream channels can effect water quality and aquatic habitat due to the increased sediment erosion of stream banks and beds. Sediment deposition decreases aquatic habitat diversity, degrades fish spawning and rearing habitat, and reduces survival of fish eggs and fry (Bjornn and Reiser 1991; Shepard et al 1984). Lode mining in a riparian area has the potential to remove trees that are providing stream shade and alter stream geomorphology and thus has the potential to effect stream temperatures.

Hard rock mining also has the potential to negatively affect groundwater quality by mixing waters between aquifers, introducing contaminants into groundwater systems. Mining related activities can also result in changes in pH and salt concentrations in surface and ground waters. Acid rock drainage may occur when mining or milling processes expose sulfide ores to the atmosphere (Jennings et al 2008). In addition, waste rock and tailings from mines can be a source of nitrogen (a residue of

blasting operation) to groundwater and/or nearby surface water. Fuel and lubricants associated with suction dredges is a contaminant if it enters a live stream.

Within the proposed Crevice withdrawal area there are over 38 miles of linear streams and 0.62 of those miles (1.5 percent) overlap with mineralized target areas. Due to the natural flow of water, areas downstream and at lower elevation would be susceptible to indirect effects of minerals activities that directly effects the 0.62 miles of steam. Surface and groundwater impacts can often be mitigated through the use of effective use of best management practices and site specific mitigation measures.

EO 11990 Protection of Wetlands requires protection of the 49.5 acres of wetlands within the proposed Crevice withdrawal area, and if possible, and practicable, full avoidance of adverse impacts to wetlands and their preservation.

The proposed Crevice withdrawal area includes 0.5 acres of floodplains. This small amount of acreage does not overlap with any mineralized targets and therefore the no action alternative will not have a direct or indirect effect on floodplains (EO 11988).

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects to hydrological components within the proposed withdrawal area. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B

Direct and indirect effects to aquatic species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 25 percent. The proposed action RFD estimates 25 percent less acreage of disturbance (34 acres), as compared to the no action alternative (45 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could directly or indirectly affect hydrological components.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with the 0.62 stream miles (1.5 percent). Due to the natural flow of water areas downstream and at lower elevation would be susceptible to indirect effects of minerals activities that directly effects the 0.62 miles of steam. Surface and groundwater impacts can often be mitigated through the use of effective use of best management practices and site specific mitigation measures.

EO 11990 Protection of Wetlands requires protection of the 49.5 acres of wetlands within the proposed Crevice withdrawal area, and if possible, and practicable, full avoidance of adverse impacts to wetlands and their preservation. Because there would be 25 percent less acres disturbed under the proposed action, there would be a 25 percent less chance that future minerals activities would take place near the 49.5 acres of wetlands.

The proposed Crevice withdrawal area includes 0.5 acres of floodplains. This small amount of acreage does not overlap with any mineralized targets and therefore the proposed action alternative will not have a direct or indirect effect on floodplains (EO 11988).

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects to hydrological components within the proposed withdrawal area. Cumulative effects to hydrological components would be lessened by the same

magnitude (25 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

4.7 Aquatic Species

Discussions from the above section 4.6 Hydrology about stream water quantity, wetlands, floodplains, and groundwater all feed into the environmental consequences for aquatic species.

Emigrant

Alternative A

Direct and indirect effects to aquatic species could result from impacts/disturbance to surface and ground water, stream channel stability, stream temperature, wetlands and floodplains. Impacts to these feature can cause direct mortality of individuals and impacts to populations. Indirect effects to Forest Service sensitive aquatic species may occur through the degradation of suitable habitat.

The mineralized target areas overlap with 70 acres (less than 5 percent) of suitable boreal toad habitat and none of the 1.32 stream miles with known YCT overlap with any mineralized target areas. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen the impacts.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive aquatic species known or suspected within the proposed withdrawal area. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B

Direct and indirect effects to aquatic species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 45 percent. The proposed action RFD estimates 45 percent less acreage of disturbance (47 acres), as compared to the no action alternative (85 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could displace or directly affect aquatic species.

The proposed action alternative still has the possibility of future mineral activities occurring where mineralized target areas overlap with 70 acres (less than 5 percent) of suitable boreal toad habitat. None of the 1.32 stream miles with known YCT overlap any of the mineralized target areas. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen this determination.

Cumulative Effects

Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive aquatic species known or suspected within the proposed withdrawal area. Cumulative effects to aquatic species would be lessened by the same magnitude (45 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Section 7 of the Endangered Species Act Determination
There are no ESA aquatic species known or suspected to occurrence within the proposed Emigrant withdrawal area, therefore, no determination is required.

Crevice

Alternative A
Direct and indirect effects to aquatic species could result from impacts/disturbance to surface and ground water, stream channel stability, stream temperature, wetlands and floodplains. Impacts to these feature can cause direct mortality to individuals and impacts to populations. Indirect effects to Forest Service sensitive aquatic species may occur through the degradation of suitable habitat.

The mineralized target areas overlap with 331 acres (less than five percent) of suitable boreal toad habitat and none the 9.26 stream miles with known YCT overlap with any mineralized target areas. The conservation easement overlaps with 206 acres (three percent) of suitable boreal toad habitat and 0.6 stream miles with known YCT. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH)* could be given. Implementation of mitigation measures could lessen the impacts.

Cumulative Effects
Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive aquatic species known or suspected within the proposed withdrawal area. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Alternative B
Direct and indirect effects to aquatic species would be similar to those discussed for the no action alternative. However, the overall effects would be lessened by 25 percent. The proposed action RFD estimates 25 percent less acreage of disturbance (34 acres), as compared to the no action alternative (45 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities could displace or directly affect aquatic species.

The proposed action alternative still has the possibility of future mineral activities to occur where mineralized target areas overlap with 70 acres (less than 5 percent) of suitable boreal toad habitat. None of the 1.32 stream miles with known YCT overlap any of the mineralized target areas. If minerals activities were to be approved within the mineralized target areas that overlap with these Forest Service sensitive species a determination of *May Impact Individuals or Habitat (MIIH*) could be given. Implementation of mitigation measures could lessen this determination.

Cumulative Effects
Current roads, trails, recreation uses, mining activities on private lands, and mining activities on NFS lands could cumulatively contribute to effects on sensitive aquatic species known or suspected within the proposed withdrawal area. Cumulative effects to aquatic species would be lessened by the same magnitude (25 percent) as the direct and indirect effects, due to decreased activities in the RFD scenario for the proposed action. Implementation of mitigation measures could lessen these effects, but would not negate them completely.

Section 7 of the Endangered Species Act Determination
There are no ESA aquatic species known or suspected to occurrence within the proposed Crevice withdrawal area, therefore, no determination is required.

4.8 Economics

Previous USGS report (Blackman 1994) indicated a high (83.4 percent) likelihood that at least one mine would be developed within the ABSA and that a more likely future scenario would include the development of two mines. This prediction estimates that a future mine would produce 400 to 500 tons of ore per day, creating employment of 200 to 400 direct employees, depending on whether open pit or underground. This ABSA assessment refers to an area which contains both the proposed Emigrant and Crevice withdrawal areas, but is not specific to either watershed. Applying the proportion of the 83.4 percent likelihood prediction (for the whole ABSA area) to just the proposed Emigrant and Crevice withdrawal areas, the likelihood statistic falls below 10 percent. The predicted 200 to 400 direct employees would also be lessened due to unlikelihood of an open pit mine being proposed for either the Emigrant or Crevice areas.

The below direct employees numbers have come from the RFD scenarios and take into account the likelihood of development within the proposed Emigrant and Crevice withdrawal areas only. Employment numbers would vary from year to year based on the type and level of operations. The RFD displays estimated durations of activities by type of exploration and mining projects, therefore the RFD employment numbers below have been adjusted to reflect full time employment over the 20-year duration of the proposed withdrawal. The current 53 minerals related jobs within Park County were added into the analysis below for each area, Emigrant and Crevice, separately.

Emigrant

Alternative A

The RFD estimates 71 employees could be working in the mining industry, over the 20 year time frame, under the no action alternative. Measuring indirect/induced effects can be done within existing county industries. Park County does have ore mining support services, which could help supply any scalable mine development in the area. Given current infrastructure, a 2015 data IMPLAN model estimation shows that for every $10 million in gross output of gold, or other ore production, $1 million would be spent in secondary supportive industries located in Park County. The $1 million demand placed on support industries, from primary industries, would yield an additional six jobs and $312,000 in wages, direct, indirect and induced in these secondary industries.

The 71 direct employees combined with the six indirect jobs would add an additional 77 employees to Park County over the 20 proposed withdrawal period. If the total number of jobs with Park County were also to increase by 77 jobs there would be 10,174 jobs. The projected 77 employees added with the current 53 (BEA 2016) mineral related jobs would yield a total of 130 possible direct and indirect minerals related jobs. These jobs would make up 1.2 percent of the total projected jobs. This would be a 0.70 percent increase from the 2015 numbers (BEA).

In comparison, Park County's employment for industries related to tourism and visitation there was an estimated 3,104 employees (BEA 2016). This equates to 30 percent of jobs within Park County related to tourism and visitation (recreation).

Cumulative Effects

In the 1980's, Park County metal ore, oil and gas, and other mineral related employment levels were between 100 and 200 jobs. Today, there are approximately 53 of these type of jobs (BEA). These industries in Park County have declined over the last three decades. In the future, it is possible that new discoveries and mining developments would change this employment and overall industry trend, however, without existing or proposed infrastructure changes, or new mines in the area there are no known cumulative economic effect associated with this alternative.

Alternative B

The RFD estimates 33 employees could be working in the mining industry, over the 20 year time frame, under the proposed action alternative. Measuring indirect/induced effects can be done within existing county industries. Park County does have ore mining support services, which could help supply any scalable mine development in the area. Given current infrastructure, a 2015 data IMPLAN model estimation shows that for every $10 million in gross output of gold, or other ore production, $1 million would be spent in secondary supportive industries located in Park County. The $1 million demand placed on support industries, from primary industries, would yield an additional six jobs and $312,000 in wages, direct, indirect and induced in these secondary industries.

The 33 direct employees combined with the six indirect jobs would add an additional 39 employees to Park County over the 20 proposed withdrawal period. If the total number of jobs with Park County were also to increase by 39 jobs there would be 10,136 jobs. The projected 39 employees added with the current 53 (BEA 2016) mineral related jobs would yield a total of 92 possible direct and indirect minerals related jobs. Thirty eight less jobs than under the no action alternative. These 92 jobs would make up 0.9 percent of the total projected jobs, which is 0.3 percent less than under the no action alternative and a 0.38 percent increase from the current (BEA 2016).

In comparison, Park County's employment for industries related to tourism and visitation there was an estimated 3,104 employees (BEA 2016). This equates to 30 percent of jobs within Park County related to tourism and visitation (recreation).

Cumulative Effects

In the 1980's, Park County metal ore, oil and gas, and other mineral related employment levels were between 100 and 200 jobs. Today, there are approximately 53 of these type of jobs (BEA). These industries in Park County have declined over the last three decades. In the future, it is possible that new discoveries and mining developments could change this employment and overall industry trend, however, without existing or proposed infrastructure changes, or new mines in the area there are no known cumulative economic effect associated with this alternative.

Crevice

Alternative A

The RFD estimates 33 employees could be working in the mining industry, over the 20 year time frame, under the no action alternative. Measuring indirect/induced effects can be done within existing county industries. Park County does have ore mining support services, which could help supply any scalable mine development in the area. Given current infrastructure, a 2015 data IMPLAN model estimation shows that for every $10 million in gross output of gold, or other ore production, $1 million would be spent in secondary supportive industries located in Park County. The $1 million demand placed on support industries, from primary industries, would yield an additional six jobs and $312,000 in wages, direct, indirect and induced in these secondary industries.

The 39 direct employees combined with the six indirect jobs would add an additional 39 employees to Park County over the 20 proposed withdrawal period. If the total number of jobs with Park County were also to increase by 39 jobs there would be 10,136 jobs. The projected 39 employees added with the current 53 (BEA 2016) mineral related jobs would yield a total of 92 possible direct and indirect minerals related jobs. These jobs would make up 0.9 percent of the total projected jobs. This would be a 0.3 percent increase from the 2015 numbers (BEA).

In comparison, Park County's employment for industries related to tourism and visitation there was an estimated 3,104 employees (BEA 2016). This equates to 30 percent of jobs within Park County related to tourism and visitation (recreation).

Cumulative Effects

In the 1980's, Park County metal ore, oil and gas, and other mineral related employment levels were between 100 and 200 jobs. Today, there are approximately 53 of these type of jobs (BEA). These industries in Park County have declined over the last three decades. In the future, it is possible that new discoveries and mining developments would change this employment and overall industry trend, however, without existing or proposed infrastructure changes, or new mines in the area there are no known cumulative economic effect associated with this alternative.

Alternative B

The RFD estimates 27 employees could be working in the mining industry, over the 20 year time frame, under the proposed action alternative. Measuring indirect/induced effects can be done within existing county industries. Park County does have ore mining support services, which could help supply any scalable mine development in the area. Given current infrastructure, a 2015 data IMPLAN model estimation shows that for every $10 million in gross output of gold, or other ore production, $1 million would be spent in secondary supportive industries located in Park County. The $1 million demand placed on support industries, from primary industries, would yield an additional six jobs and $312,000 in wages, direct, indirect and induced in these secondary industries.

The 27 direct employees combined with the six indirect jobs would add an additional 34 employees to Park County over the 20 proposed withdrawal period. If the total number of jobs with Park County were also to increase by 34 jobs there would be 10,131 jobs. The projected 34 employees added with the current 53 (BEA 2016) mineral related jobs would yield a total of 87 possible direct and indirect minerals related jobs. Five less jobs than under the no action alternative. These 87 jobs would make up 0.85 percent of the total projected jobs, which is 0.05 percent less than under the no action alternative and a 0.33 percent increase from the current (BEA 2016).

In comparison, Park County's employment for industries related to tourism and visitation there was an estimated 3,104 employees (BEA 2016). This equates to 30 percent of jobs within Park County related to tourism and visitation (recreation).

Cumulative Effects

In the 1980's, Park County metal ore, oil and gas, and other mineral related employment levels were between 100 and 200 jobs. Today, there are approximately 53 of these type of jobs (BEA). These industries in Park County have declined over the last three decades. In the future, it is possible that new discoveries and mining developments could change this employment and overall industry trend, however, without existing or proposed infrastructure changes, or new mines in the area there are no known cumulative economic effect associated with this alternative.

4.9 Heritage Resources

Emigrant

Alternative A

Proposed locatable minerals activities, including staking new claims, would continue to have the potential to directly affect cultural resources through ground disturbing activities such as blasting, building, drilling, earth-moving/excavating, and road construction/improvement. Of the six recorded cultural sites, consisting of three lithic artifact scatters, two mine adits, and a B-47E Stratojet Bomber crash area, one site overlaps with a mineralized target area.

With less than two percent of the proposed Emigrant withdrawal area inventoried, and only six cultural sites recorded, the presence of additional cultural resources is high. There is potential that unrecorded sites could overlap with the estimated 85 acres of disturbance associated with the RFD

scenario. Any new locatable minerals proposed would be subject to review and inventory survey. If cultural resources are present steps would be taken to avoid/protect, reduce direct effects, in compliance with applicable law, regulation, and policy.

Cumulative Effects
Future proposed locatable minerals activities, including staking new claims, would continue to have the potential to indirectly affect cultural resources. Road construction/improvement could provide increased public access to the area which in turn could result in vandalism to cultural sites.

Alternative B
Direct and indirect effects to heritage resources would be similar to those discussed for the no action alternative. However, the overall potential effect to the one site overlapping with a mineralized target areas would be lessened by 45 percent. The proposed action RFD estimates 45 percent less acreage of disturbance (47 acres), as compared to the no action alternative (85 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities would overlap with known or unknown heritage resources.

With less than two percent of the proposed Emigrant withdrawal area APE inventoried, and only six cultural sites recorded, the presence of additional cultural resources is high. There is potential that unrecorded sites could overlap with the estimated 47 acres of disturbance associated with the RFD scenario. Any new ground disturbing locatable minerals activities proposed would be subject to review and inventory survey. If cultural resources are present steps would be taken to avoid/protect, reduce direct effects, in compliance with applicable law, regulation, and policy.

Cumulative Effects
Future proposed locatable minerals activities, including staking new claims, would continue to have the potential to indirectly affect cultural resources. Road construction/improvement would provide increased public access to the area which in turn could result in vandalism to cultural sites.

Crevice

Alternative A
Proposed mining activities, including requests for new claims, would continue to have the potential to directly affect cultural resources through ground disturbing activities such as blasting, building, drilling, earth-moving/excavating, and road construction/improvement. The 51 recorded sites contain, a historic irrigation ditch, eighteen prehistoric occupations (lithic artifact scatters, quarries, sheep hunting blinds, stone circles), and 32 mining related sites, none of these are currently being directly affected by mining activities. Of these 51 recorded sites 10 overlap with mineralized target areas.

With approximately 28.6 percent of the proposed Crevice withdrawal APE inventoried, and 51 cultural sites recorded, the presence of additional cultural resources is high. There is potential that unrecorded sites could overlap with the estimated 45 acres of disturbance associated with the RFD scenario. Any new locatable minerals proposed would be subject to review and inventory survey. If cultural resources are present steps would be taken to avoid/protect, reduce direct effects, in compliance with applicable law, regulation, and policy.

Cumulative Effects
Future proposed locatable minerals activities, including staking new claims, would continue to have the potential to indirectly affect cultural resources. Road construction/improvement would provide increased public access to the area which in turn could result in vandalism to cultural sites.

Alternative B
Direct and indirect effects to heritage resources would be similar to those discussed for the no action alternative. However, the overall potential effects to any of the 10 sites overlapping with a mineralized target areas would be lessened by 25 percent. The proposed action RFD estimates 25 percent less acreage of disturbance (34 acres), as compared to the no action alternative (45 acres). With the reduced number of acres disturbed, there is less likelihood that minerals activities would overlap with known or unknown heritage resources.

With less than two percent of the proposed Emigrant withdrawal area APE inventoried, and only six cultural sites recorded, the presence of additional cultural resources is high. There is potential that unrecorded sites could overlap with the estimated 47 acres of disturbance associated with the RFD scenario. Any new locatable minerals proposed would be subject to review and inventory survey. If cultural resources are present steps would be taken to avoid/protect, reduce direct effects, in compliance with applicable law, regulation, and policy.

Cumulative Effects
Future proposed locatable minerals activities, including staking new claims, would continue to have the potential to indirectly affect cultural resources. Road construction/improvement would provide increased public access to the area which in turn could result in vandalism to cultural sites.

Section 5: Agencies and Individuals Consulted

Invitations to comment on the *Federal Register* Notice of Proposed Withdrawal and this environmental assessment were extended to organizations on the forest-wide scoping mailing list. Such organizations include officials of county governments in Montana, state agencies concerned with land and natural resource management, other federal agencies, watershed councils, industry groups, and environmental groups known to have an interest in federal lands management in Montana. Additionally, public news releases regarding the opportunity to comment were distributed to local media outlets for both the Federal Register 90 day comment period and the 30 day scoping period. A complete list of agencies and individuals contacted/consulted is contained within the project.

Tribal Partners

The general area encompassing the proposed Emigrant and Crevice withdrawal areas have long been considered Crow Territory. However, the Shoshoni-Bannock, Nez Perce, Northern Cheyenne, Confederate Tribes of the Umatilla Indian Reservation, Confederated Tribes and Bands of Yakama Nation, and the Confederated Salish and Kootenai Tribes, have expressed interest in public land management within the area. Prior to the start of the 30 day comment notice the above Tribal partners received written notices inviting their members to engage with the Forest Service about the proposed locatable minerals withdrawal.

State Historical Preservation Office

On December 5, 2017 the Forest Supervisor of the Custer Gallatin National Forest sent the Montana State Historic Preservation Officer notice of the *No Effect* determining for the proposed action along with the relevant materials for this determination. A concurrence determination of *No Effect* was returned on December 8, 2017 from the Montana State Historical Preservation Office.

Section 6: Citations

Barndt, S. 2011. Distribution and status of Gallatin National Forest aquatic management indicator species. Custer Gallatin National Forest. Bozeman, Montana.

Basler AL 1965. Geology of the Emigrant Peak intrusive complex, Park County, Montana by Albert L Basler. A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE in Applied Science, Montana State University. Available online at: http://scholarworks.montana.edu/xmlui/handle/1/4784

Berg, R. B., Lopez, D.A., and Lonn, J.D., J. D., and Locke, W. W., 2000, Geologic Map of the Livingston 30' x 60' Quadrangle, Southwest Montana, Montana Bureau of Mines and Geology Open File Report MBMG 406. Available online at: http://mbmg.mtech.edu/mbmgcat/public/ListCitation.asp?pub_id=11277&

U.S. Department of Commerce. (BEA) 2016. Bureau of Economic Analysis, Regional Economic Accounts, Washington, D.C.

Bjornn, T. C. and D. W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138 in W. R. Meehan ed. Influences of forest and rangeland management on salmonid fish and their habitat. American Fisheries Society Special Publication 19:83-138, 1991.

Blackman, L., 1994, The Potential for Undiscovered Mineral Resources in the Absaroka-Beartooth Study Area, part of the Custer and Gallatin National Forests, Montana: U.S. Bureau of Mines, Mineral Land Assessment open file report 7-94, 17 p.

Canfield, Jodie E. 2016. Gallatin Forest Plan Management Indicator Species Assessment-Population and Habitat Trends. Unpublished paper on file at: U.S. Department of Agriculture, Forest Service, Gallatin National Forest Supervisor's Office, Bozeman, MT 33 pages.

Crevice Mining Group (CMG), 2016, amended Plan of Operations: Exploration Program Crevice Mining Project, prepared for Montana DEQ Hard Rock Mining Program, 192 p.

eBird. 2017. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. (Accessed: Date [September 6, 2017]).

Foose, Richard M., Wise, Donald W., Garbarini, George, S. 1961; Structural Geology of the Beartooth Mountains, Montana and Wyoming. GSA Bulletin ; 72 (8): 1143–1172. Available online at: https://doi.org/10.1130/0016-7606(1961)72[1143:SGOTBM]2.0.CO;2

Fraser, G.D., Waldrop, H.A., and Hyden, H.J., 1969, Geology of the Gardiner area, Park County, Montana: U.S. Geological Survey Bulletin, 1277, 118 p., (incl. geologic map, scale 1:24,000). Available online at: https://ngmdb.usgs.gov/Prodesc/proddesc_21373.htm

Geologic Systems. 2015. The Emigrant Mining District Project, South Central Montana. A National Instrument 43-101 Report. 83 pp.

Grosvenor, R., 2017, personal communication with US Forest Service, Gallatin National Forest Minerals Administrator, 2 p.

Hammarstrom JM, AB Wilson, BS Van Gosen, RR Carlson, DM Kulik , GK Lee, JE Elliott , WJ Perry Jr. , EA du Bray, and ML Zientek 1998. Mineral resource assessment; Custer and Gallatin national forests, Montana. USGS Open-File Report 98-517. Available online at: https://pubs.er.usgs.gov/publication/ofr98517

Hammarstrom, J.M., Zientek, M.L., and Elliott, J.E., eds., 1993, Mineral resource assessment of the Absaroka-Beartooth study area, Custer and Gallatin National Forests, Montana: U.S. Geological Survey, Open-File Report 93-207, 298 p. Available online at: https://pubs.er.usgs.gov/publication/ofr93207

Harvey, B.C. and Lisle, T.E. 1998. Effects of Suction Dredging on Streams: a Review and an Evaluation Strategy. Fisheries. 23(8):8-17.

Horizon Water and Environment LLC. 2009. Literature Review on the Impacts of Suction Dredge Mining in California. In: California Department of Fish and Game Suction Dredge Permitting Program. California Department of Fish and Game, Redding, CA. 123 pp.

Interagency Lynx Biology Team (ILBT). 2013. Canada lynx conservation assessment and strategy. 3rd edition. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Forest Service Publication Rl-13-19, Missoula, MT. 128 pp

Jennings, S.R., Neuman, D.R. and Blicker, P.S. 2008. Acid Mine Drainage and Effects on Fish Health and Ecology: A Review. Reclamation Research Group Publication, Bozeman, MT.

Johnson, R., Boleneus D., Cather E., Grahm D., Hughes C., McHugh E., and Winters D., 1993. Mineral Resource Appraisal of the Gallatin National Forest, Montana: U.S. Bureau of Mines, Mineral Lands Assessment open file report 19-93, 183 p.

Kharaka, Y., Mariner, R., Bullen, T., Kennedy, M., and Sturchio, N. 1991. Chapter F: Geochemical Investigations of Hydraulic Connections Between the Corwin Springs Known Geothermal Resources Area and Adjacent Parts of Yellowstone National Park, in Effects of Potential Geothermal Development in the Corwin Springs Known Geothermal Resources Area, Montana, on the Thermal Features of Yellowstone National Park, Sorey, M., ed: U.S. Geological Survey, Water-Resources Investigations Report 91-4052, 1991, pp. F1-F38. Available online at: https://pubs.usgs.gov/wri/1991/4052/report.pdf

Kharaka, Y., Thordsen, J., and White, L. 2002. Isotope and Chemical Compositions of Meteoric and Thermal Waters and Snow from the Greater Yellowstone National Park Region. U.S. Geological Survey, Open-file report 02-194, 2002, 75 p. Available online at: https://pubs.usgs.gov/of/2002/ofr02-194/pdf/OFR_02-194.pdf

LaFave, J.I. 2016. Baseline Water-Quality Investigation, Emigrant Creek Watershed, South-Central Montana. MBMG Ground Water Open-File Report 23. Montana Bureau of Mines and Geology, Butte, MT. 19 pp.

Lahren, Dr. Larry. 2006. Homeland: An archaeologist's view of Yellowstone Country's past. Cayuse Press, Livingston, MT.

Lane, J., 2017, Montana Department of Environmental Quality (MDEQ), personal communication July 24.

Manning, A.H. and Caine, J.S. 2008. Developing a Conceptual Model of Ground-Water Flow in an Alpine Watershed in Understanding Contaminants Associated with Mineral Deposits. USGS Circular 1328. 103 pp.

McCulloch, R. 1999. Mine Design of the Emigrant Creek Sulfide Placer, Park Co., MT. Unpublished Montana Tech of the University of Montana MS Thesis

MDEQ. 2016. 303(d) List. Montana Department of Environmental Quality, Helena, MT

MDEQ. 2017. Final Environmental Assessment for Lucky Minerals (Montana), Inc. Lucky Minerals Project, Park County, Montana Exploration License Application #00795. Montana DEQ Hard Rock Mining Bureau. Helena, MT. 376 pp. Available online at: http://deq.mt.gov/Portals/112/Land/Hardrock/Active%20Applications/LuckyMinerals/LuckyMinerals_EA_Final_Web_2017.pdf?ver=2017-07-25-164916-037

Medicine Crow, Joe and Daniel S. Press. 1966. A Handbook of Crow Indian Laws and Treaties. Crow Agency, Montana.

Montagne J and D Lageson 1995. History of Geologic Exploration of the Yellowstone River Valley (Paradise Valley), Southwest Montana, in Northwest Geology, v. 24, p. 315-330, 1995. Published by the Department of Earth Sciences Montana State University, Bozeman, MT 59717.

Montana Natural Heritage Program (MTNHP). 2017. Natural Heritage Environmental Summary. Retrieved on September 8, 2017.

Montana Partners in Flight. 2000. Partners in Flight Bird Conservation Plan Montana. American Bird Conservancy. Kalispell, MT.

Seager, G., 1944, Gold, arsenic, and tungsten deposits of the Jardine-Crevasse Mountain District, Park County, Montana: Montana Bureau of Mines and Geology Memoir 23, 111 p.

Shepard B. S., S. Leathe, T. Weaver, and M. Enk. 1984. Monitoring levels of fine sediment within tributaries to Flathead Lake and impacts of fine sediment on bull trout Recruitment. IN: Proceedings of the Wild Trout III Symposium. Mammoth Hot Springs, Yellowstone National Park, Wyoming. Sept. 24-25, 1984.

Sonderegger, J. 1984. Summary of Geothermal Studies in Montana. Montana Bureau of Mines and Geology, Open-File Report 142, 1984, 33 p. Available online at: https://pubs.er.usgs.gov/publication/ofr02194

TVX Mineral Hill Inc. 2017. 2016 Annual Hydrological Monitoring Report, Operating Permit 00100, TVX Mineral Hill Mine, Park County, Montana. April 2017. Prepared by TVX Minerals Inc. Unpublished report submitted to Montana Department of Environmental Quality.

USDA Forest Service. (FSH 1909.15) 2012. Forest Service Handbook, National Environmental Policy Act Handbook, chapter 10- Environmental Analysis. June 25, 2012.

USDA Forest Service. (FSM 2620) 2007. Forest Service Manual, Wildlife, Fish, and Sensitive Plant Habitat Management, chapter 20- Habitat Planning and Evaluation. October 17, 2007.

USDA Forest Service. (FSM 2803.5) 2012. Forest Service Manual, Minerals and Geology, Chapter-Zero Code. September 13, 2012.

USDA Forest Service. (USDA FS) 1987 as amended through 2015. Gallatin National Forest, Forest Plan, United States Department of Agriculture, Forest Service, Bozeman, Montana.

USDA Forest Service. (USDA FS) 1995. Landscape Aesthetics, Scenery Management Handbook, #701.

USDA Forest Service. (USDA FS) 2007. Record of Decision for Incorporating the Northern Rockies Lynx Management Direction into the Land and Resource Management Plans for the Beaver-Deerlodge, Bitterroot, Clearwater, Custer, Flathead, Gallatin, Helena, Idaho Panhandle, Kootenai, Lewis & Clark.

USDA Forest Service. (USDA FS) 1986. Jardine Joint Venture Project. USDA Forest Service, Gallatin National Forest. Bozeman, MT. 544 pp.

US Bureau of Land Management, 2016, Guidance on 43 CRF 3809.100 and its Application: Instruction Memorandum No. 2016-149, 2 p.

USDI Fish and Wildlife Service. 2009. Revised designation of critical habitat for the contiguous United States distinct population segment of the Canada Lynx; final rule. February 25, 2009. Federal Register 74(36):8616-8702.

USDI Fish and Wildlife Service. 1993. Grizzly bear recovery plan (revised from 1982). Missoula, MT 181 pp.

USDI Fish and Wildlife Service. 2014. Revised critical habitat for the contiguous United States distinct population segment of the Canada lynx (Lynx canadensis); proposed rule. September 12, 2014. Federal Register 79(177): 54782-54845.

US Geology Survey. (USGS) 1996. HA 730-I Montana, North Dakota, South Dakota, Wyoming, Published 1996 in Miller 2000, The Ground Water Atlas of the United States, USGS Hydrologic Atlas 730. Available online at: https://pubs.usgs.gov/ha/730i/report.pdf

Van Gosen BS 1993. Bibliography of Geologic References (1872-1992) to the Absaroka-Beartooth Study Area in the Custer and Gallatin National Forests, South-Central Montana compiled by Bradley S. Van Gosen. U.S. DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY Open-File Report OF 93-285. Available online at: https://pubs.usgs.gov/of/1993/0285a/report.pdf

Wedow, JR., Helmuth, David L. Gaskill, Darcy P. Banister and Eldon C. Pattee 1975. Mineral Resources of the Absaroka Primitive Area and Vicinity, Park and Sweet Grass Counties, Montana. Geological Survey Bulletin 1391-B. A mineral and geophysical survey of the area. Available online at https://pubs.usgs.gov/bul/1391b/

Wilson JT 1936. The geology of the Mill Creek-Stillwater area, Montana. Princeton University Ph. D. thesis, 131 p.

Weber, P.K. 1986. Downstream effects of placer mining in the Birch Creek Basin, Alaska. Technical Report No. 86-7. Alaska Department of Fish and Game Division of Habitat. Juneau, Alaska 99803.

Appendix A: Application For Withdrawal

MTM 109072

Application for Withdrawal

Emigrant and Crevice Area
Gardiner and Yellowstone Ranger Districts
Custer Gallatin National Forests
Park County, Montana

1. APPLICANT:

USDA Forest Service
Northern Region
P.O. Box 7669
Missoula, MT 59807

2. DELEGATION OF AUTHORITY:

Authority for requesting land withdrawals involving National Forest System lands has been delegated to the Chief of the Forest Service, as specified in 7 CFR 2.60(a) (2), and further delegated to the Director and Deputy of Lands by Notice in the Federal Register Vol. 44 No. 247 page 75690. The Director of Lands subsequently delegated this authority to each Regional Forester for National Forest System land within his/her jurisdiction.

This application is made under the authority of Section 204(c) of the Federal Land Policy and Management Act of 1976; in accordance with regulations contained in 43 CFR 2310.1-2(c).

3. CONSENT OF HEAD OF NON-INTERIOR AGENCY

The requested withdrawal involves only National Forest System Lands under the administration of the U. S. Department of Agriculture, Forest Service, which hereby consents to the application.

4. TYPE OF WITHDRAWAL REQUESTED:

The application pertains to the making of a new withdrawal. The Forest Service requests withdrawal of Federal lands from entry and location under the United States mining laws, as amended, for the purpose of limiting locatable mineral activities in order to maintain other public values in the area and protect and preserve the area for its scenic integrity, important wildlife corridors, and high quality recreation values. The area would remain open to other uses of the National Forest System lands including the mineral leasing laws.

5. DESCRIPTION OF THE LANDS:

The application includes approximately 30,370 acres of public lands managed by the U.S. Forest Service within the Proposed Withdrawal Area, Montana. There are an additional 1,668 acres of non-Federal lands and non-Federal mineral rights within the exterior boundary of the Proposed Withdrawal Area (Map 1). The application boundary encompasses approximately 32,038 acres. Exhibit "1" (attached) describes the lands proposed for withdrawal.

6. EXISTING WITHDRAWAL:

Legal descriptions and acres of existing withdrawals which overlap the Emigrant Crevice proposed withdrawal are contained in Exhibit 2 (attached).

7. PURPOSE FOR WITHDRAWAL:

These lands are requested for withdrawal from location and entry under the United States mining laws. The purpose of the withdrawal is to protect and preserve the scenic integrity, important wildlife corridors, and high quality recreation values in the historic "Emigrant Mining District" and the "Jardine/Crevice Mining District" on the Custer Gallatin National Forest in Park County, Montana. The withdrawal will protect the outstanding natural resources present in this area which is adjacent to the Absaroka – Beartooth Wilderness and within portions of the North Absaroka and Chico Peak Inventoried Roadless Areas as well as Sliding Mountain Research Natural Area (Gallatin Forest Plan 1987).

The area provides a unique combination of special places and outstanding resource values directly north of Yellowstone National Park. As part of the Greater Yellowstone ecosystem, the proposed Withdrawal area provides important wildlife habitat and corridors for grizzly bear, Canada lynx, and a variety of other wildlife species. Similarly, the area exhibits high quality outdoor recreation values because of its spectacular scenery, scenic integrity, abundance of wildlife and relatively undisturbed characteristics - the maintenance of which is significant to the local economy. The area requested for withdrawal is also the headwaters of a number of streams that eventually flow into the Yellowstone River. Maintenance of water quality, and high value aquatic resources, are important economic values for local recreational fisheries and uses.

8. EXTENT OF WITHHOLDING & SEGREGATION PERIOD:

The Forest Service requests the lands to be segregated for 2 years in accordance with 43 CFR 2310.2(a). Subject to valid existing rights, the Forest Service requests that the lands described above would be temporarily withdrawn from location and entry under the United States mining laws.

During this period, the USDA Forest Service will prepare an environmental analysis and submit it to the Secretary of the Interior in accordance with 43 CFR 2310.3-2. These documents and other records relating to this application may be examined at the Supervisors' Offices of the Custer Gallatin National Forest, 10 East Babcock Ave, Bozeman, MT 59715.

9. TEMPORARY LAND USE TO BE ALLOWED DURING SEGREGATION:

Subject to valid existing rights, the lands will be closed to the mining laws during the segregation period. All other activities currently consistent with the Forest plan could continue, including public recreation and other activities compatible with preservation of the character of the area.

10. ANALYSIS OF ALTERNATIVES:

Neither a right of way reservation under section 507 of the Act (43 U.S.C. 1767), nor a cooperative agreement under sections 302(b) (43 U.S.C. 1732(b)) and section 307(b) (43 U.S.C. 1737(b)) would provide adequate protection for unique resource values which are found in the Emigrant and Crevice proposed withdrawal areas. Because of the broad scope and nondiscretionary nature of locatable mineral activities conducted via the general mining laws, the area would remain open to entry under the general mining act and vulnerable to adverse effects associated with prospecting, development and mining.

11. DURATION OF THE WITHDRAWAL:

The Forest Service requests a withdrawal for a 20 year duration as permitted by 43 CFR 2310.3-4.

12. ALTERNATIVE SITES:

There are no alternative sites because the lands subject to this withdrawal application are lands that protection is sought from locatable entry under the United States mining laws.

13. WATER NEEDS:

Water will not be required to fulfill the purpose of the requested withdrawal action.

14. RECORD AVAILABILITY:

Records relating to this application can be examined at: Custer Gallatin National Forest Supervisor's Office, 10 East Babcock Ave, Bozeman, MT 59715.

15. PRELIMINARY INDICATION of MINERAL RESOURCES

Emigrant Mining District:

The Emigrant Mining District (Map 2, dated October 27, 2016), located 26 miles south of Livingston, encompasses the Emigrant Creek drainage and parts of the Mill Creek and Sixmile Creek drainages. It is adjacent to the Absaroka-Beartooth Wilderness as designated by Congress in 1978.

Within the Emigrant District, mineral deposits occur as sulfide disseminations, stockwork, breccia pipe and hydrothermal vein structures. In general, the mineralization types present may be classed as a Cu-Mo-Au porphyry deposit. At least 23 bedrock mineral occurrences have been identified in a northeast trending mineralized belt approximately 7 miles long and 0.5 miles wide with the most condensed breccia pipes found on the southwest end of this trend in Emigrant Gulch. Both porphyry and breccia locations can be high in pyrite (FeS2), which would put the area at risk of acid drainage if mining were to occur, particularly as there is apparently little to no carbonate minerals to neutralize acid. All the mineralization, whether as porphyry or in breccia, appears to be sulfide-based: chalcopyrite (CuFeS2), covellite (CuS), galena (PbS), chalcocite (Cu2S), molybdenite (MoS2), and sphalerite (ZnS). Significant ferricrete (iron oxide) deposits have formed in the East Fork of Emigrant Creek illustrating the acid forming capacity of orebodies in the district.

The Emigrant Mining District has had historical production and has been the site of lode and placer operations beginning in 1863. During the period from 1864 to 1946 an estimated 40,000 ounces of gold were produced predominately from placer operations. A significant proportion was generated by a large dredge placer operations located off National Forest Lands. A limited amount of lode claim production (a few hundred ounces) is documented from the St. Julian Mine with most other prospects generally unknown or small.

Generally, minerals are indicated to be diffuse and wide spread in the anticipated mineralized zones. In "Mineral Resource Appraisal of the Gallatin National Forest" by F. L. Johnson and others (DOI, Bureau of Mines, 1993), four deposits (including the creek placers) in Emigrant Gulch area.

The Emigrant area has recently been the subject of two separate exploration proposals. Lucky Minerals Inc, had previously submitted Plans of Operations pertaining to core drilling within lands managed by the Custer Gallatin National Forest. At the same time, Lucky Minerals also submitted a Plan of Operations to the Montana Department of Environmental Quality related to similar core drilling exploration activities within private patented mineral claims associated with the St. Julian and DUV properties. Subsequently, the mineral proponent has withdrawn their Plan of Operations filed with the Forest Service, but has an Exploration Permit pending with the Montana DEQ and is currently the subject of a Draft Environmental Assessment.

Crevice Mining District:

The subject area, identified as the Crevice withdrawal area (Map 3, dated October 27, 2016) was historically known as the Crevasse historic mining district. This proposed withdrawal area also includes an area formally referred to as the Jardine historic mining district which lies north of the Crevice mining district. The Jardine district has also been referred to as the "Bear Gulch District" or "Sheepeater District".

The area of the proposed Crevice withdrawal area lies in the Bear Creek drainage adjacent to the northern boundary of Yellowstone National Park and to the east and northeast of Gardiner, Montana. It is bounded on the north and east by the Absaroka-Beartooth Wilderness as designated by Congress in 1978. Generally, the district is separated into two structurally separate blocks: Mineral Hill (Jardine) and Crevice Mountain.

Placer gold was discovered as early as 1866 and quartz deposits were discovered in 1870s but the area was not actively developed unit the 1880s because it was part of the Crow Reservation. Through 1937, production is estimated at 7,692 ounces of gold with minor byproducts of silver and sheelite. By 1922, arsenopyrite ore was being exploited as a strategic source for arsenic and continued intermittently until 1948.

Modern gold mining operations began at Mineral Hill in the 1980s, ceasing in 1999. These vein deposits yielded some 800,000 tons of ore at a grade of 0.268 oz Au/ton. Attempts in 1996 to tunnel from Mineral Hill under Palmer Mountain to reach the Crevice Mountain mineralized zone (to avoid surface disturbance on the border of and visibility from Yellowstone National Park) was halted after hitting unexpected groundwater, which continues to discharge into Bear Creek at approximately 200 gallons per minute. This is administered and regulated under Montana Department of Environmental Quality, Montana Pollutant Discharge Elimination System (MPDES) permit MT0030252. An *in situ* evaporative tailings facility (approximately 252,000 cubic yards) remains on site, operated by TVX Mineral Hill Inc./Kinross Gold Corp., also permitted through the Montana Department of Environmental Quality.

The primary target on Crevice Mountain is considered the "Conrad" zone with gold, arsenic, lead, copper and zinc in parallel veins, or strands, averaging 3.5 to 4 feet in width primarily under patented mining claims. Additional gold anomalies have been identified on public lands in the "Tower Grove," "Buffalo Mountain," and "West Buffalo Mountain" zones surrounding Crevice Mountain.

Exhibit 1

Principal Meridian, Montana
T. 6 S., R. 8 E.,
secs. 34 and 35;
sec. 36, lots 1 thru 8, W1/2NE1/4, W1/2, and SE1/4SE1/4.
T. 7 S., R. 8 E.,
sec. 10, lot 1, N1/2, N1/2SW1/4, SE1/4SW1/4, and SE1/4;
sec. 11, S1/2;
sec. 12, S1/2;
secs. 13, 14, and 15;
protracted blocks 37 thru 41.
T. 6 S., R. 9 E.,
sec. 31, lots 1 thru 6, NE1/4, E1/2NW1/4, NE1/4SE1/4, and W1/2SE1/4;
sec. 32, S1/2;
sec. 33, S1/2.
T. 7 S., R 9 E.,
sec. 9, unsurveyed;
sec. 10, W1/2, unsurveyed;
secs. 16 and 17, unsurveyed;
protracted blocks 39 thru 45.
T. 8 S., R. 9 E.,
secs. 22 thru 26, unsurveyed, those portions not within the Absaroka-Beartooth Wilderness;
protracted blocks 41 thru 46, those portions not within the Absaroka-Beartooth Wilderness;
protracted blocks 47 and 48;
protracted block 49, that portion not within the Absaroka-Beartooth Wilderness;
H.E.S. No. 856.
T. 9 S., R. 9 E.,
secs. 1 and 2, those portions not within the Absaroka-Beartooth Wilderness;
sec. 3, lots 1, 2, and 3, NE1/4, N1/2NW1/4, SE1/4NW1/4, E1/2SW1/4, and SE1/4;
sec. 4, lot 2, lots 5 thru 9, lots 12 thru 15, N1/2NE1/4, and NW1/4;
sec. 5, lots 1 thru 6, N1/2NE1/4, SW1/4NE1/4, NW1/4, and W1/2SE1/4;
sec. 6, lot 1, lots 5 thru 12, NE1/4, and NE1/4NW1/4;
sec. 7, lots 5 and 6, S1/2NE1/4, E1/2NW1/4, E1/2SW1/4, and SE1/4;
sec. 8, lots 1, 4, 5, 6, 9, and 10, SW1/4NW1/4, and SW1/4, excepting Wormsbecker Boundary Adjustment Tract, Certificate of Survey No. 792BA, filed in Park County, Montana, July 22, 1985, Document No. 186782;
sec. 9, lots 1, 3, and 4, lots 9 thru 15, and S1/2SE1/4;
sec. 10, lots 1 and 2, N1/2, SW1/4, and N1/2SE1/4;
sec. 11, lots 1, 2, 3, 5, and 6, N1/2NE1/4, NW1/4, N1/2SW1/4, SE1/4SW1/4, SW1/4SE1/4, those portions not within the Absaroka-Beartooth Wilderness;
sec. 14, lots 1 thru 8, NW1/4NE1/4, SE1/4SW1/4, and W1/2SW1/4, those portions not within the Absaroka-Beartooth Wilderness;
sec. 15, lots 1 thru 9, NW1/4, and W1/2SW1/4;
sec. 16, lots 1 thru 5, E1/2, N1/2NW1/4, and SW1/4NW1/4;

sec. 17, lots 2 and 3, lots 5 thru 8, SE1/4NE1/4, NW1/4NW1/4, SE1/4SW1/4, and SE1/4;
sec. 18, lots 1 thru 6, NE1/4, E1/2NW1/4, E1/2SW1/4, and W1/2SE1/4;
sec. 19, lots 1 thru 14, NE1/4NW1/4, and NE1/4SE1/4, including the bed of the Yellowstone River;
sec. 20, lots 2 thru 5, N1/2SW1/4, and N1/2SE1/4;
sec. 21;
sec. 22, lots 2 thru 13, W1/2NW1/4, and NW1/4SW1/4;
sec. 23, lots 1 thru 10, NE1/4, and N1/2SE1/4, those portions not within the Absaroka-Beartooth Wilderness;
Tracts 37, 38, and 39;
H.E.S. No. 253.

The areas described aggregate approximately 30,370 acres.

Non-Federal Minerals

The Non-Federal minerals listed herein are included within the proposed withdrawal area with the intent of withdrawing them from entry in the event they should be returned to or should pass into Federal ownership in the future.

Principal Meridian, Montana

T. 6 S., R. 8 E.,
M.S. No. 10643, except that portion lying northerly of the line bet. secs. 25 and 36;
M.S. No. 6079.

T. 7 S., R. 8 E.,
M.S. No. 8838, except that portion lying westerly of the line bet. secs. 9 and 10.

Tps. 6 S., Rs. 8 and 9 E.,
M.S. No. 6078.

Tps. 6 and 7 S., Rs. 9 E.,
M.S. No. 4087;
M.S. No. 4724.

T. 7 S., R. 9 E.,
M.S. No. 58;
M.S. No. 6705;
M.S. No. 6706;
M.S. No. 6707;
M.S. No. 6939;
M.S. No. 6940;
M.S. No. 6941;
M.S. No. 9015;
M.S. No. 9858;
M.S. No. 10229.

T. 9 S., R. 9 E.,
sec. 20, lot 1 and SW1/4NW1/4;
M.S. No. 46;
M.S. No. 47;

M.S. No. 44, that portion lying northerly of the E-W center line of the SE1/4 of sec. 8;
M.S. No. 48;
M.S. No. 61;
M.S. No. 62, that portion lying northerly of the E-W center line of the SE1/4 of sec. 8;
M.S. No. 4535;
M.S. No. 4536;
M.S. No. 4537;
M.S. No. 4538;
M.S. No. 4557;
M.S. No. 4558;
M.S. No. 4559;
M.S. No. 4560;
M.S. No. 4899;
M.S. No. 4900;
M.S. No. 4901;
M.S. No. 4902;
M.S. No. 4903;
M.S. No. 4904;
M.S. No. 4905;
M.S. No. 5527;
M.S. No. 5528;
M.S. No. 5529;
M.S. No. 5531;
M.S. No. 5532;
M.S. No. 5533;
M.S. No. 5542;
M.S. No. 5573A;
M.S. No. 5573B;
M.S. No. 5581;
M.S. No. 5583;
M.S. No. 5613;
M.S. No. 5614;
M.S. No. 5627;
M.S. No. 5628;
M.S. No. 5629;
M.S. No. 5674;
M.S. No. 5675;
M.S. No. 5676;
M.S. No. 5713;
M.S. No. 5786;
M.S. No. 5819;
M.S. No. 5820;
M.S. No. 6117;
M.S. No. 6283;
M.S. No. 6284;
M.S. No. 6341;

M.S. No. 6374;
M.S. No. 6376;
M.S. No. 6377;
M.S. No. 6657;
M.S. No. 6930;
M.S. No. 6931;
M.S. No. 6999;
M.S. No. 7000;
M.S. No. 7001;
M.S. No. 7002;
M.S. No. 7003;
M.S. No. 7004;
M.S. No. 7005;
M.S. No. 7006;
M.S. No. 7007;
M.S. No. 7008;
M.S. No. 7108;
M.S. No. 8869;
M.S. No. 8876;
M.S. No. 9023;
M.S. No. 9024;
M.S. No. 9035, that portion not within the Absaroka-Beartooth Wilderness;
M.S. No. 9681;
M.S. No. 9771;
M.S. No. 9906;
M.S. No. 10774;
Wormsbecker Boundary Adjustment Tract, Certificate of Survey No. 792BA, filed in Park County, Montana, July 22, 1985, Document No. 186782.

The areas described aggregate approximately 1,668 acres of non-Federal mineral lands.

Exhibit 2 Existing Withdrawals

This withdrawal will overlap portions of three existing withdrawals.

1. Approximately 4,117 acres of federal land withdrawn in Executive Order (EO) No. 3053, 2/28/1919, as described below, will be overlapped. This EO withdrew federal lands from surface entry and non-metalliferous mineral entry:

Principal Meridian, Montana
T. 9 S., R. 9 E.,
sec. 7, lots 5 and 6, S1/2NE1/4, E1/2NW1/4, E1/2SW1/4, and SE1/4;
sec. 8, lots 1, 4, 5, 6, 9, and 10, SW1/4NW1/4, and SW1/4, excepting Wormsbecker Boundary Adjustment Tract, Certificate of Survey No. 792BA, filed in Park County, Montana, July 22, 1985, Document No. 186782;
sec. 9, lots 1, 3, and 4, lots 9 thru 15, and S1/2SE1/4;
sec. 16, lots 1 thru 5, E1/2, N1/2NW1/4, and SW1/4NW1/4;
sec. 17, lots 2 and 3, lots 5 thru 8, SE1/4NE1/4, NW1/4NW1/4, SE1/4SW1/4, and SE1/4;
sec. 18, lots 1 thru 6, NE1/4, E1/2NW1/4, E1/2SW1/4, and W1/2SE1/4;
sec. 19, lots 1 thru 14, NE1/4NW1/4, and NE1/4SE1/4, including the bed of the Yellowstone River;
sec. 20, lots 2 thru 5, N1/2SW1/4, and N1/2SE1/4;
sec. 21;
H.E.S. No. 253, those portions within secs. 7 and 8;

2. Approximately 184 acres of federal land withdrawn for Power Site Reserve (PSR) No. 527, 3/28/1916, as described below, will be overlapped. This PSR is withdrawn from surface disposal only:

Principal Meridian, Montana
T. 9 S., R. 9 E.,
sec. 19, lots 7 thru 14 and NE1/4SE1/4, those portions within 1/4 mile of the Yellowstone River;
sec. 20, lot 2 and NW1/4SW1/4, those portions within 1/4 mile of the Yellowstone River.

3. Approximately 104.93 acres of federal land withdrawn for Power Site Classification (PSC) No. 94, 5/2/1925, as described below, will be overlapped. This PSC is withdrawn from surface disposal only:
Principal Meridian, Montana
T. 9 S., R. 9 E.,
sec. 11, SW1/4SE1/4, that portion not within the Absaroka-Beartooth Wilderness;
sec. 14, lot 5, NW1/4NE1/4, NW1/4SE1/4, and SE1/4SE1/4, those portions not within the Absaroka-Beartooth Wilderness;
sec. 22, lot 4;
sec. 23, lots 1, 2, and 3, and NW1/4NE1/4, those portion not within the Absaroka-Beartooth Wilderness.

Appendix B: List of Preparers

This EA was prepared and reviewed by a team from the Forest Service, National Park Service, and the BLM. Table B-1 identified team members, their roles, and their qualifications pursuant to 43 CFR 2310.3-2 (a).

Table B-1. Interdisciplinary team members and reviewers for the Proposed Emigrant Crevice Mineral Withdrawal.

Organization	Name	Qualifications	Project Role
BLM	Joan Gabelman	Geologist, Mineral Examiner #0144	Reviewer
FS	Allison Kolbe	B.S. Wildlife Biology	Reviewed wildlife report components and provided Forest specific wildlife information
FS	Angela Gatto	B.S. Biology, M.S. Forestry	Wildlife Biologist
FS	Annette Yeager	B.S. Biology	GIS Specialist
FS	Clint Sestrich	B.S. & M.S. Fish and Wildlife Management, Fisheries Biologist	Fisheries Biologist, Aquatic Biota Specialist
FS	Dale Graff	B.S. Land Surveying, Licensed Land Surveyor	Surveyor, Lands Research, Legal Description Writer
FS	Dale White	B.S. Civil Engineering, M.S. Forest Hydrology	Water Quality Specialist
FS	Dan Seifert	B.S. Earth Science – Geology; B.A. English literature.	Custer Gallatin NF Assistant Forest Geologist. Minerals/Geology Technical Specialist. Temporary project manager.
FS	Halcyon La Point	M.A. Anthropology; Custer Gallatin National Forest, Forest Archaeologist	Archaeologist; Heritage Program Manager; Cultural Resource Specialist Report review; Montana State Historic Preservation Office and Tribal consultation
FS	Kim Reid	B.S. Range Science	Sensitive Plants Biological Evaluation
FS	Mark Aughtman	Licensed Land Surveyor,	Surveyor, Lands Research, Legal Description Writer
FS	Mike W. Bergstrom	B.S. Sociology - Anthropology Option; Custer Gallatin National Forest Zone Archaeologist	Archaeologist; Project Area field review; Cultural Resource Specialist Report
FS	Mindy Sue Vogel	M.S. Geology	Geologist, Mineral Examiner Candidate
FS	Nancy Taylor	B.S. Animal and Range Science -Science option; M.S. Animal and Range Science; M.S. Range Science - Wildlife/Livestock interactions; Graduate Certificate Wilderness Management	Recreation - Wilderness Specialist
FS	Sitka Pence	B.S. Conservation Ecology, B.S. Forest Resources, M.S. Environmental Planning	Project Manager, NEPA Specialist, writer/editor
FS	Suzanne DiGiacomo	B.S. Biology, M.S. Biology	Sensitive Plants Biological Evaluation
FS	Will Pedde	B.A. Geography with Cartography emphasis.	Land Status Specialist, GIS Specialist
NPS	Doug Madsen	B.S Horticulture, Landscape Design, M.L.A. Landscape Architecture	Scenic Resources Analysis

Appendix C: Mineral Commodity Summaries

The USGS annually publishes Mineral Commodity Summaries that includes information on events, trends, and issues for each mineral commodity. Table C-1 provides a summary of present and potential market demand information for locatable minerals with high occurrence potential in the proposed Emigrant Crevice withdrawal area from USGS's 2017.

Table C-1. Present and potential market demands for high occurrence potential locatable minerals in withdrawal area (USGS 2017).

Mineral	Domestic Production and Use	Events, trades and Issues	World Resources
Gold	In 2016, domestic gold mine production was estimated to be about 209 tons, slightly less than that in 2015, and the value was estimated to be about $8.5 billion. Gold was produced at more than 40 lode mines, at several large placer mines in Alaska, and numerous smaller placer mines (mostly in Alaska and in the Western States). About 6% of domestic gold was recovered as a byproduct of processing domestic base-metal ores, chiefly copper. Estimated domestic uses were jewelry; 40%; electrical and electronics, 35%; official coins, 20%; and other, 5%.	The estimated gold price in 2016 was 9% more than the price in 2015 and was 24% lower than the record-high annual price in 2012. The slight 2016 decrease in domestic mine production was attributed to lower production from mines that changed ownership and closure of some smaller scale mines in Nevada. Worldwide 2016 gold production was unchanged from that in 2015.	An assessment of U.S. gold resources indicated 33,000 tons of gold in identified (15,000 tons) and undiscovered (18,000 tons) resources.9 Nearly one-quarter of the gold in undiscovered resources was estimated to be contained in porphyry copper deposits. The gold resources in the United States, however, are only a small portion of global gold resources.
Silver	In 2016, U.S. mines produced approximately 1,100 tons of silver with an estimated value of $570 million. Silver was produced at 3 silver mines and as a byproduct or coproduct from 37 domestic base and precious-metal mines. Alaska continued as the country's leading silver-producing State, followed by Nevada. There were 24 U.S. refiners that reported production of commercial-grade silver with an estimated total output of 2,100 tons from domestic and foreign ores and concentrates and from old and new scrap. In 2016, the estimated domestic uses for silver were electrical and electronics, 30%; coins and medals, 27%; jewelry and silverware, 7%; photography, 6%; and other, 30%.	The estimated average 2016 silver price in 2016 was 25% higher than the average price in 2015. In 2016, global physical demand for silver was projected to decrease in most sectors. World silver mine production increased slightly in 2016 to 26,800 tons, principally as a result of increased production from mines in China, Mexico, Peru, and Poland. Domestic 2016 silver mine production increased slightly compared with that in 2015.	Although silver was a principal product at several mines, silver was primarily obtained as a byproduct from lead-zinc mines, copper mines, and gold mines. The polymetallic ore deposits from which silver was recovered account for more than two-thirds of U.S. and world resources of silver. Most recent silver discoveries have been associated with gold occurrences; however, copper and lead-zinc occurrences that contain byproduct silver will continue to account for a significant share of reserves and resources in the future.
Lead	Six lead mines in Missouri, plus five mines in Alaska, Idaho, and Washington that produced lead as a coproduct, accounted for all domestic lead mine production. The value of the lead in concentrates mined in 2016, based on the average North American Market price for refined lead, was about $665 million. It was estimated that the lead-acid battery industry accounted for more than 85% of reported U.S. lead consumption during 2016. During the first 8	Domestic 2016 mine production decreased from that in the previous year, owing primarily to decreased production in Alaska, Missouri, and Washington, but partially offset by an increase in Idaho. Production at mines in southeastern Missouri decreased by about 18,000 tons (about 10% of annual production), reportedly owing to increased operating costs and price declines for metals. Total domestic secondary lead production was slightly greater than that in 2015.	Identified world lead resources total more than 2 billion tons. In recent years, significant lead resources have been identified in association with zinc and (or) silver or copper deposits in Australia, China, Ireland, Mexico, Peru, Portugal, Russia, and the United States (Alaska).

Mineral	Domestic Production and Use	Events, trades and Issues	World Resources
	months of 2016, 83.6 million lead-acid automotive batteries were shipped by North American producers, a slight increase from those shipped in the same period of 2015.	Global lead mine production was expected to decline slightly to about 4.82 million tons in 2016, partially owing to declines in Australia (one mine closure and reduced production at others) and the United States.	
Zinc	The value of zinc mined in 2016, based on zinc contained in concentrate, was about $1.70 billion. Zinc was mined in 5 States at 12 mines operated by 4 companies. Three smelter facilities, one primary and two secondary, operated by two companies, produced commercial-grade zinc metal. Of the total reported zinc consumed, most was used in galvanizing, followed by brass and bronze, zinc-based alloys, and other uses.	Global zinc mine production in 2016 was 11.9 million tons, 7% less than that of 2015. The zinc metal market fell into a sizable deficit during 2016, with consumption exceeding production.	Identified zinc resources of the world are about 1.9 billion tons.
Copper	U.S. 2016 mine production of copper increased slightly, to about 1.41 million tons, and was valued at about $6.8 billion. Arizona, New Mexico, Utah, Nevada, Montana, and Michigan, in descending order of production, accounted for more than 99% of domestic mine production. Copper and copper alloy products were used in building construction, 44%; transportation equipment, 19%; electric and electronic products, 18%; consumer and general products, 12%; and industrial machinery and equipment, 7%.	A decrease in the average copper price compared with that of 2015 was in large part attributed to lower consumption growth in China. The International Copper Study Group projected that in 2016, global refined copper consumption and production would be essentially balanced. Global production of refined copper was projected to increase by 2.2% and consumption was projected to increase by 1.5%.	A 1998 USGS assessment estimated 550 million tons of copper were contained in identified and undiscovered resources in the United States. A 2014 USGS global assessment of copper deposits indicated that identified resources contain about 2.1 billion tons of copper (porphyry deposits accounted for 1.8 billion tons of those resources), and undiscovered resources contained an estimated 3.5 billion tons.
Molyb-denum	U.S. mine production of molybdenum in 2016 decreased by 33% to about 31,600 tons, and was valued at about $458 million (based on an average oxide price). Molybdenum ore was produced as a primary product at two mines—both in Colorado—whereas seven copper mines (four in Arizona and one each in Montana, Nevada, and Utah) recovered molybdenum as a byproduct. Iron and steel and superalloy producers accounted for about 76% of the molybdenum consumed.	U.S. estimated mine output of molybdenum in 2016 decreased by 33% from that of 2015. U.S. imports for consumption increased by 15% from those of 2015, and U.S. exports decreased by 15% from those of 2015. Reported U.S. consumption of primary molybdenum products decreased by 6% from that of 2015. Apparent consumption of molybdenum concentrates decreased by 27% from that of 2015. The decline in U.S. molybdenum production was attributed mainly to the closure of the Thompson Creek Mine, as well as a major decrease in production at the Bingham Canyon Mine in Salt Lake County, UT.	Identified resources of molybdenum in the United States are about 5.4 million tons, and in the rest of the world, about 14 million tons. Molybdenum occurs as the principal metal sulfide in large low-grade porphyry molybdenum deposits and as an associated metal sulfide in low-grade porphyry copper deposits. Resources of molybdenum are adequate to supply world needs for the foreseeable future. Global molybdenum production in 2016 decreased by 4% compared with 2015.
Tungsten	A newly opened tungsten mine in northwest Utah produced concentrates in 2016. Nearly 60% of the tungsten used in the United States was used in cemented carbide parts for cutting and wear-resistant applications, primarily in the construction, metalworking, mining, and oil and	2016 world tungsten supply was dominated by production in and exports from China. China was also the world's leading tungsten consumer. In terms of tonnage, mine production outside China has steadily increased since 2010. In 2014, Vietnam became the second leading global	World tungsten resources are geographically widespread. China ranks first in the world in terms of tungsten resources and reserves and has some of the largest deposits. Canada, Kazakhstan, Russia, and the United States also have significant tungsten resources.

Mineral	Domestic Production and Use	Events, trades and Issues	World Resources
	gas drilling industries. The remaining tungsten was used to make various alloys and specialty steels; electrodes, filaments, wires, and other components for electrical, electronic, heating, lighting, and welding applications; and chemicals for various applications.	producer of tungsten concentrates, new mine production began in the United Kingdom and Zimbabwe in 2015, and a tungsten operation in Spain began producing tungsten concentrates from mined ore in 2016. An economic slowdown in China and weak economic conditions elsewhere ultimately led to tungsten supply exceeding consumption.	
Arsenic	No United States domestic arsenic production was reported in 2016.	High-purity (99.9999%) arsenic metal was used to produce gallium-arsenide (GaAs), indium-arsenide, and indium gallium-arsenide semiconductors used in biomedical, communications, computer, electronics, and photovoltaic applications. The 2015 value of worldwide GaAs device consumption increased by about 7% to $7.5 billion. Cellular applications accounted for approximately 53% of total GaAs device revenue and wireless communications accounted for 27%. Various automotive, consumer, fiber-optic, and military applications accounted for the remaining revenue.	Arsenic may be obtained from copper, gold, and lead smelter flue dust, as well as from roasting arsenopyrite, the most abundant ore mineral of arsenic. Arsenic has been recovered in China, Peru, the Philippines, Chile, and Canada.